

Diaphragm Valves
Manually and Pneumatically Actuated Valves

SISTO-C
SISTO-B



SISTO-C HV.510/.520 with Handwheel



SISTO-C with LAP.520/.530



SISTO-C HV with Handwheel



SISTO-C-LAP

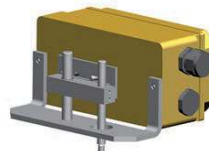
SISTO-C Accessories



SK.500/.510 electrical actual-position feedback unit with travel stop



SK.500/.510 electrical actual-position feedback unit



Electro-pneumatic positioner



Travel stop for HV.520 MD 168-202



Directly-mounted feedback unit



Feedback unit with limit switch



Travel stop in opening direction



Travel stop in closing direction

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Glossary

Type series booklet

The type series booklets for SISTO-C (8644.1) and SISTO-SK-i (8676.5) can be downloaded at:
<http://sisto-aseptic.com/downloads/>
or
<https://products.ksb.com>

SISTO-catalogue

The catalogue for the sterile processes (8652.10) can be downloaded at:
<http://sisto-aseptic.com/downloads/>
or
<https://products.ksb.com>

Technical literature

The technical literature on our products can be downloaded at:
<http://sisto-aseptic.com/downloads/>
or
<https://products.ksb.com>

S-C

Type series SISTO-C

S-B

Type series SISTO-B

HV

SISTO-C manually operated valve

HV.510

SISTO-C manually operated valve with plastic handwheel

HV.520

SISTO-C manually operated valve with stainless steel handwheel

LAP.520

SISTO-C diaphragm valve with pneumatic piston actuator, stainless steel

LAP.523

SISTO-C diaphragm valve with pneumatic piston actuator, stainless steel, high-temperature variant

LAP.530

SISTO-C diaphragm valve with pneumatic piston actuator, aluminium, hard anodised

LAP-AZ = OPEN/CLOSED = double-acting actuators

- Air-to-open
- Air-to-close

LAP-OF = opening spring = actuator fail-open

- Spring-to-open
- Air-to-close

LAP-SF = closing spring = actuator fail-closed

- Air-to-open
- Spring-to-close

1 General

1.1 Principles

This operating manual applies to the SISTO-B and SISTO-C type series as well as to the SISTO-C accessories made by the company SISTO Armaturen S.A. The operating manual describes the proper and safe use of this equipment in all phases of operation.

It further describes the proper and safe use of SISTO-C type series accessories / special variants, applicable for HV.510/.520 manually operated valves and LAP.520/.530 actuated valves in all phases of operation.

In the event of damage, discrepancies and questions, immediately contact SISTO Armaturen S.A. sales organisation responsible in order to maintain the right to claim under warranty.

Only correct installation, maintenance or repair will ensure smooth operation of the valves.

The manufacturer shall not accept any liability for the valves and/or accessories/special variants if the instructions set forth in this manual are not complied with.

The descriptions and instructions set forth in the operating manual refer to the standard models but are also applicable to variants.

The sectional drawings in the operating manual provide examples of the general design/configuration of the valves.

For illustrations relating to specific type series and further information please refer to the respective type series booklets.

The numbers in brackets [] indicated the references to the figures and the list of components.

1.2 Contact data

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After-Sales-Services
18, rue Martin Maas
L-6468 Echternach Luxembourg

Tel.: +352 32 50 85-1

Fax: +352 32 89 56

Email: info@sisto-aseptic.com

www.sisto-aseptic.com

1.3 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel.

1.4 Other applicable documents




Table 1: Overview of other applicable documents

Document	Description
Type series booklet 8644.1	Valve description SISTO-C
General assembly drawing ¹⁾	Sectional drawing of the valve
Sub-supplier product literature ²⁾	Drawings and other product literature
Reference: Operating manual 8676.81 ³⁾	Installation/operating manual: SK-i/SK-i AS-i Intelligent Feedback Unit
SISTO-Catalogue 8652.10	Catalogue „Sterile Processes“

2 Safety information

2.1 Key to safety symbols/markings


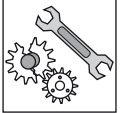

Table 2: Definition of safety symbols/markings

Symbol	Description
	DANGER In conjunction with the signal word DANGER this symbol indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
	WARNING In conjunction with the signal word WARNING this symbol indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
	CAUTION In conjunction with the signal word CAUTION this symbol indicates a low-risk hazard which, if not avoided, could result in minor injury.

¹⁾ If agreed to be included in the scope of supply; otherwise refer to the type series booklet.

²⁾ If agreed to be included in the scope of supply.

³⁾ This product is not described in this document but in a separate operating manual.

Symbol	Description
	Electrical hazard In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	ATTENTION In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.
	NOTE This symbol indicates recommendations and important information on how to handle the product.

2.2 General

This operating manual contains general installation, operating and maintenance instructions that must be observed to ensure safe operation and prevent personal injury and damage to property.

Comply with all the safety instructions given in the individual sections of this operating manual.

The operating manual must be read and understood by the responsible specialist personnel/operators prior to installation and commissioning.

The contents of this operating manual must be available to the specialist personnel at the site at all times.

Instructions and information attached directly to the valve must always be complied with and kept in a perfectly legible condition at all times.

The operator is responsible for any eventualities or incidents which may occur during installation performed by the customer, operation and maintenance.

The operator is responsible for ensuring compliance with all local regulations.

Valves must only be operated by skilled personnel.

Incorrect operation of a valve may have adverse effects on the entire system, for example:

- Leakage of the fluid handled
- System/machine brought to a standstill
- Impairment/reduction/increase of the system's/machine's function/effect.

For any queries you may have or in the case of damage, please contact the manufacturer.

For any queries and repeat orders, in particular for purchasing spare parts, please specify if possible:

- type series or variant details
- order number
- year of construction
- part-no.

The operating manual must be kept for the entire life cycle of the equipment.

When assembling components from various manufactures, the operating manuals of the individual components must also be complied with.

As regards the design, production and inspection, valves manufactured by SISTO Armaturen S.A. are subject to a QA system in accordance with DIN EN ISO 9001 the European Pressure Equipment Directive 2014/68/EU and, if applicable, the Machinery Directive 2006/42/EC. Compliance with these requirements, however, is based on normal, static loading, e.g.

- Flow velocities typical of the fluid handled,
- Typical temperature gradients.

Valves manufactured by SISTO Armaturen S.A. are not designed for use in systems handling unstable fluids.

Other than normal loads and operating conditions (temperature, pressure, special corrosive, chemical or abrasive influences, etc.) must be specified fully and clearly in the purchase order, so that the valve manufacturer can prepare and suggest suitable measures. Such measures may influence

- Material selection
- Wall thickness
- Variants

The valves must not be operated outside the permissible operating range. The application limits are indicated on the nameplate or in the applicable type series booklet. The pressure/temperature ratings, in particular, must not be exceeded. Operation outside the above-mentioned conditions will result in overloads the valves cannot withstand.

Non-observance of this warning may cause personal injury and damage to property, for example:

- Injuries resulting from fluid leakage (cold/hot, toxic, under pressure ...).
- Impairment of the valve's function or their destruction.

2.3 Intended use

- The intended use of the valves is documented in the corresponding type series booklets.
- The valves must only be operated in perfect technical condition in the temperature range and pressure range indicated in the corresponding type series booklet.
- Only the fluids indicated in the type series booklet for the corresponding valve type must flow through the valves. The resistance of the valve design to the fluid flowing through it must be checked by the operator prior to commissioning.
- The accessories described in this document are intended for the SISTO-C type series of LAP.520/.530 actuated valves and HV.520 manually operated valves.
- The exact assignment of individual accessories is described in Section 8 and Section 9 under "For use with" and "Purpose".

SISTO pneumatic actuators can be used with the control medium air according to ISO 8573-1.

- Operation above 0 °C, purity class 5.4.4 should be used: filter 40 µm, oil concentration 5 mg/m³, dewpoint 3 °C.
- Operation until -10 °C purity class 5.3.4 should be used: filter 40 µm, oil concentration 5 mg/m³, dewpoint -20 °C.

To determine the required air quality, take into account the specification of all components used in the system.

2.4 Consequences and risks caused by non-compliance with this manual

Non-compliance with this operating manual will lead to forfeiture of warranty cover and of any and all rights to claims for damages.

Non-compliance can, for example, have the following consequences:

- Failure of important product functions,
- Failure of prescribed maintenance and servicing practices,
- Hazard to persons due to electrical, mechanical and chemical effects,
- Hazard to the environment due to leakage of hazardous substances.

Moving components such as the piston rod or position indicator can cause injuries.

Verify that the system or system component is in a condition that allows safe operation of the valve.

2.5 Safety awareness

In addition to the safety information contained in this operating manual and the intended use, the following safety regulations shall be complied with:

- Accident prevention, health regulations and safety regulations
- Explosion protection regulations
- Safety regulations for handling hazardous substances
- Applicable standards, directives and laws.

2.6 Safety information for the operator/user

The valves are intended for use in areas which cannot be accessed by unauthorised persons. Operation of the valves in areas which can be accessed by unauthorised persons is only permitted if appropriate protective devices are fitted at the site. This is the responsibility of the integrator or operator.

- Fit protective equipment (e.g. contact guards) supplied by the operator for hot, cold or moving parts, and check that the equipment functions properly.
- Do not remove any protective equipment (e.g. contact guards) during operation.
- Electrical hazards must be eliminated. (For details please refer to VDE regulations and the safety regulations laid down by the local energy supply companies, for instance).
- The operator has to ensure that the guards for live components are regularly checked for any damage. The valve must never be operated without appropriate protection.
- Standard SISTO diaphragm valves are designed in such a way that any rupture of the diaphragm will be indicated by fluid handled escaping from a leakage indication hole in the valve bonnet or from the stem protection below the handwheel. This must be taken into account when planning the system.
- Design variants with re-pluggable leakage indication hole in fully sealed valves can be agreed with the manufacturer.

2.7 Safety information for maintenance, inspection and installation

- The operator is responsible for ensuring that all maintenance, inspection and installation work be performed by skilled and trained personnel.
- Work on the valve must only be carried out after valve pressure has been released and the valve has been allowed to cool down and drained completely. The temperature of the fluid in all the valve's chambers must be lower than the fluid's vapourisation temperature.
- Carry out work on the valve during standstill only. When taking the valve out of service always adhere to the procedure described in the manual.
- As soon as the work has been completed, re-install and re-activate any safetyrelevant devices and protective devices. Before returning the product to service, observe all instructions on commissioning (Section 6.4, Page 15).

2.8 Unauthorised modification and manufacture of spare parts

Modifications or alterations of the valve are only permitted after consultation with the manufacturer.

Use only original spare parts or parts authorised by the manufacturer. The use of other parts can invalidate any liability of the manufacturer for resulting damage.

2.9 Unauthorised modes of operation

The warranty relating to the operating reliability and safety of the valve is only valid if the equipment is used in accordance with its intended use as described in Section 2.3. The limits stated in the technical literature must not be exceeded under any circumstances

3 Transport and Storage

The valves are ready for operation upon delivery. The connection ports are closed with suitable material (caps, plugs, covers).


3.1 Checking the condition upon delivery

Upon receipt of the goods, check immediately that the goods are complete and undamaged.

3.2 Transport

Suitable precautions shall be taken to prevent damage during transport.

Ensure sufficient stability. Use transporting equipment which complies with the standards.

	NOTE
	<p>Use any lifting lugs provided!</p> <p>The lifting lugs of the LAP.520/.530 valves are designed for a maximum load of 85 kg. Should this weight be exceeded, suspend the valve differently for transport (e.g. at the body).</p>

For the valve weights refer to the relevant manufacturer documentation.

3.3 Storage

Storage/temporary storage must ensure that even after a prolonged period of storage the function of the valve will not be impaired. The following requirements must be met:

- Storage is performed with the valve in the closed position (to protect the seating surfaces against damage).
- Measures are taken to protect the equipment against dirt, humidity, frost and corrosion (e.g. by using foils or caps; indoor storage).
- The storage temperature must be between +10 °C and +30 °C.

Ensure sufficient stability. Use transporting and moving equipment which complies with the standards.

4 Product information

Product information as per Regulation No. 1907/2006 (REACH):

For information as per chemicals Regulation (EC) No. 1907/2006 (REACH), see <http://www.ksb.com/reach>.

5 Marking

5.1 Marking of the valves

The valves are marked in accordance with Pressure Equipment Directive:

- Manufacturer
- Year of construction
- Type or order number
- DN
- PN or max. permissible pressure/temperature
- Material

The CE marking on the valve indicates that the valve is in conformity with the European Pressure Equipment Directive.

Spring-loaded actuators are additionally marked with a sign reading „**WARNING: Loaded spring, do not disassemble!**“

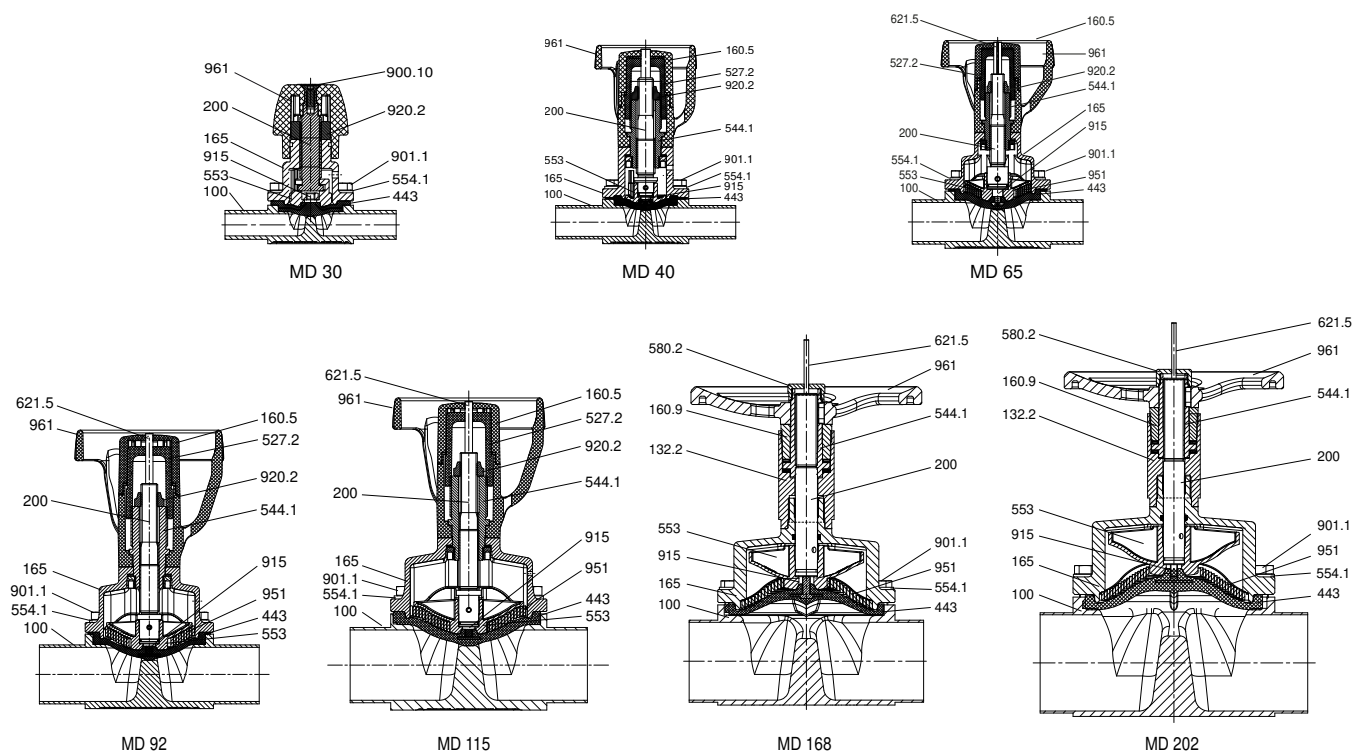


6 Diaphragm valves with handwheel or pneumatic actuator for sterile processes

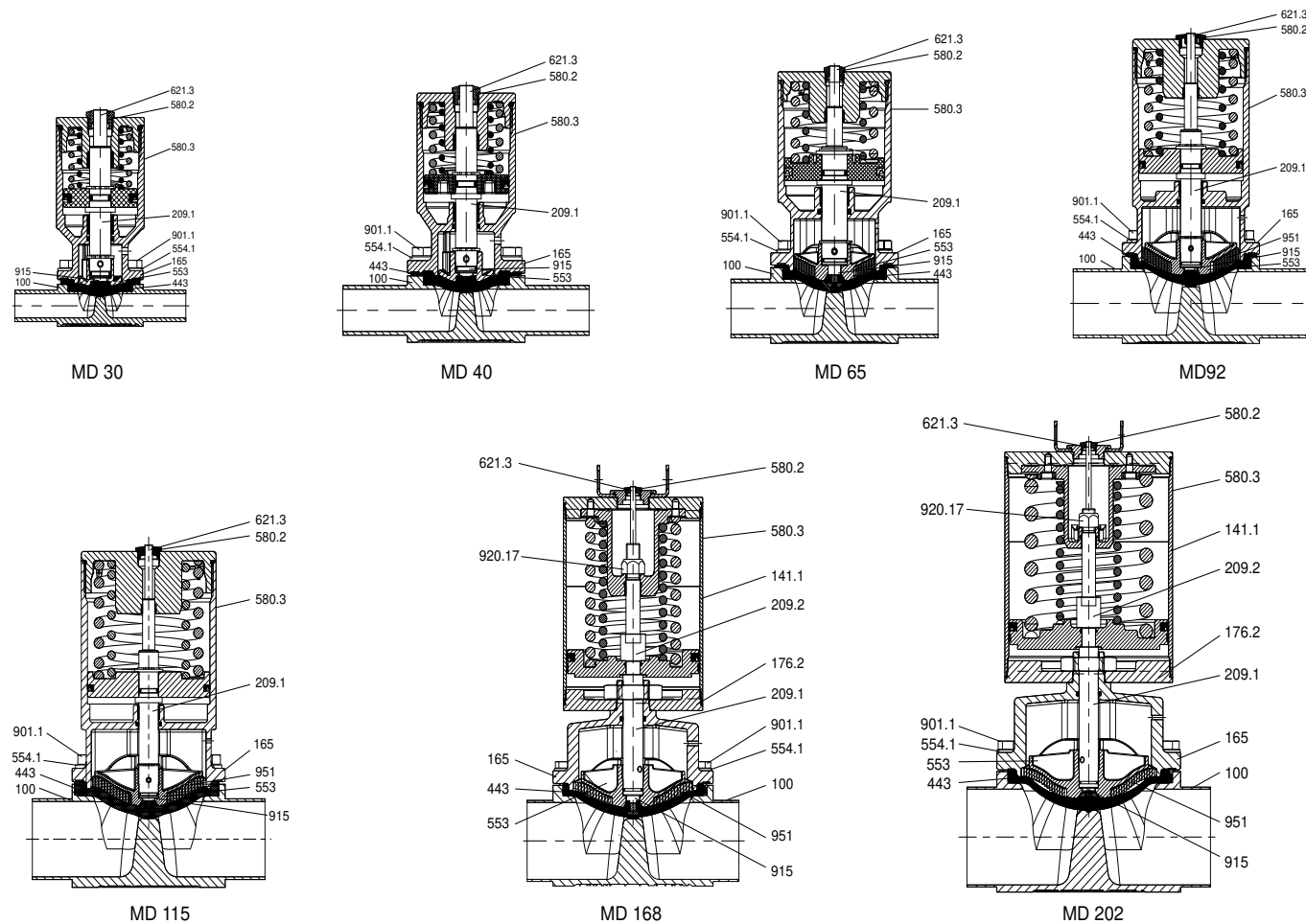
Type series	DN	PN	Material	Type series booklet No. ⁴⁾
SISTO-C	6-100	16	see Type series booklet	8644.1

Sectional drawings

SISTO-C HV.510/.520 with Handwheel



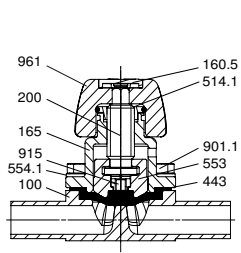
SISTO-C with LAP.520/.530 ⁵⁾



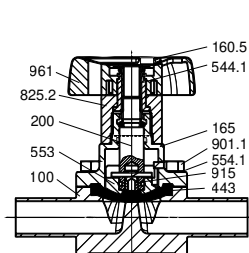
⁴⁾ Available for download at www.sisto-aseptic.com

⁵⁾ Illustration of pneumatic actuator SF

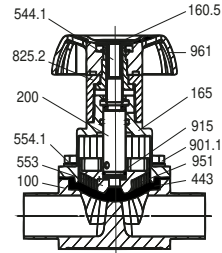
SISTO-C HV with Handwheel



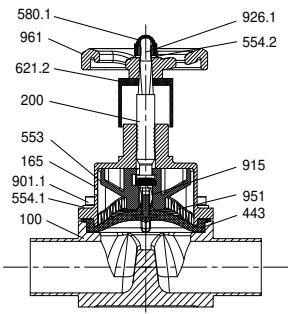
MD 30



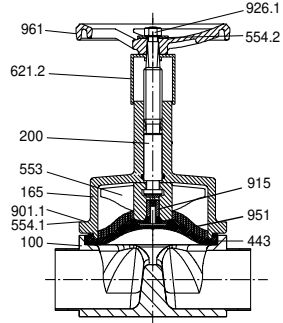
MD 40



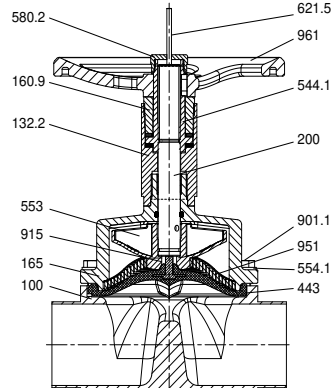
MD 65



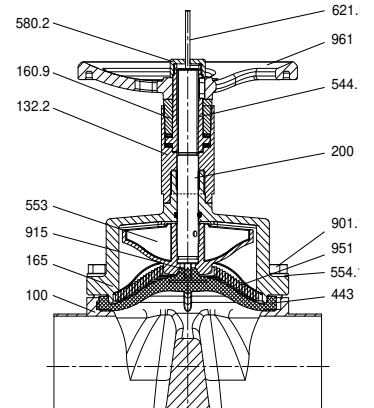
MD 92



MD 115

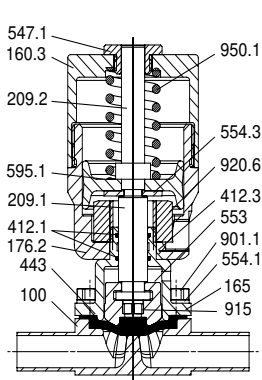


MD 168

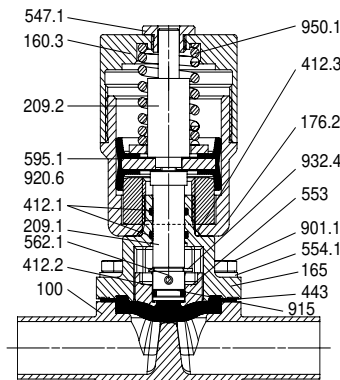


MD 202

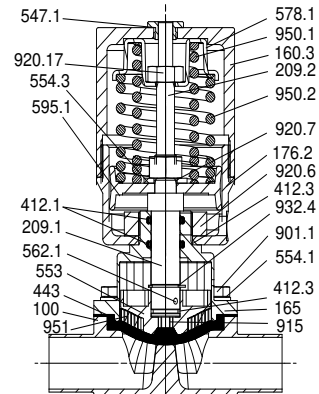
SISTO-C with LAP-SF



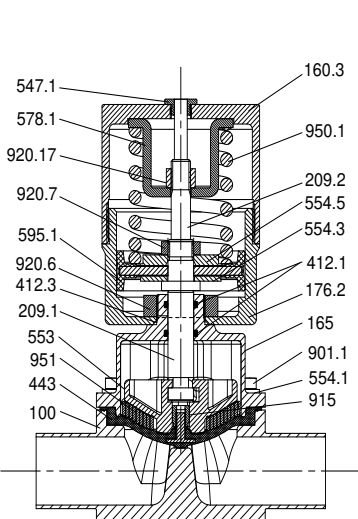
MD 30



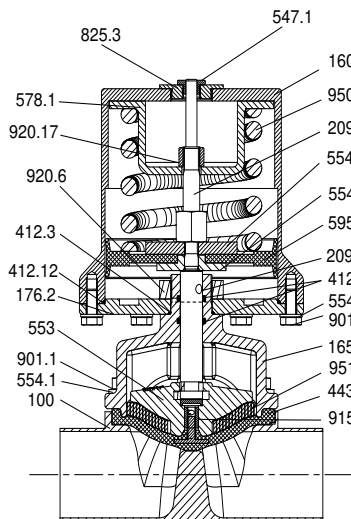
MD 40



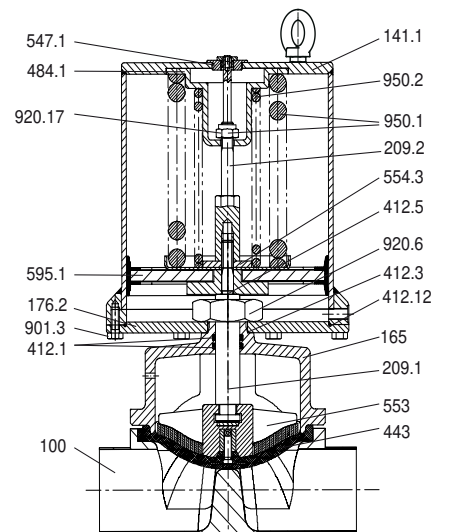
MD 65



MD 92



MD 115



MD 168

Type series	DN	PN	Material	Type series booklet No. ⁶⁾
SISTO-B	6-100	10	see Type series booklet	8646.1

Sectional drawing

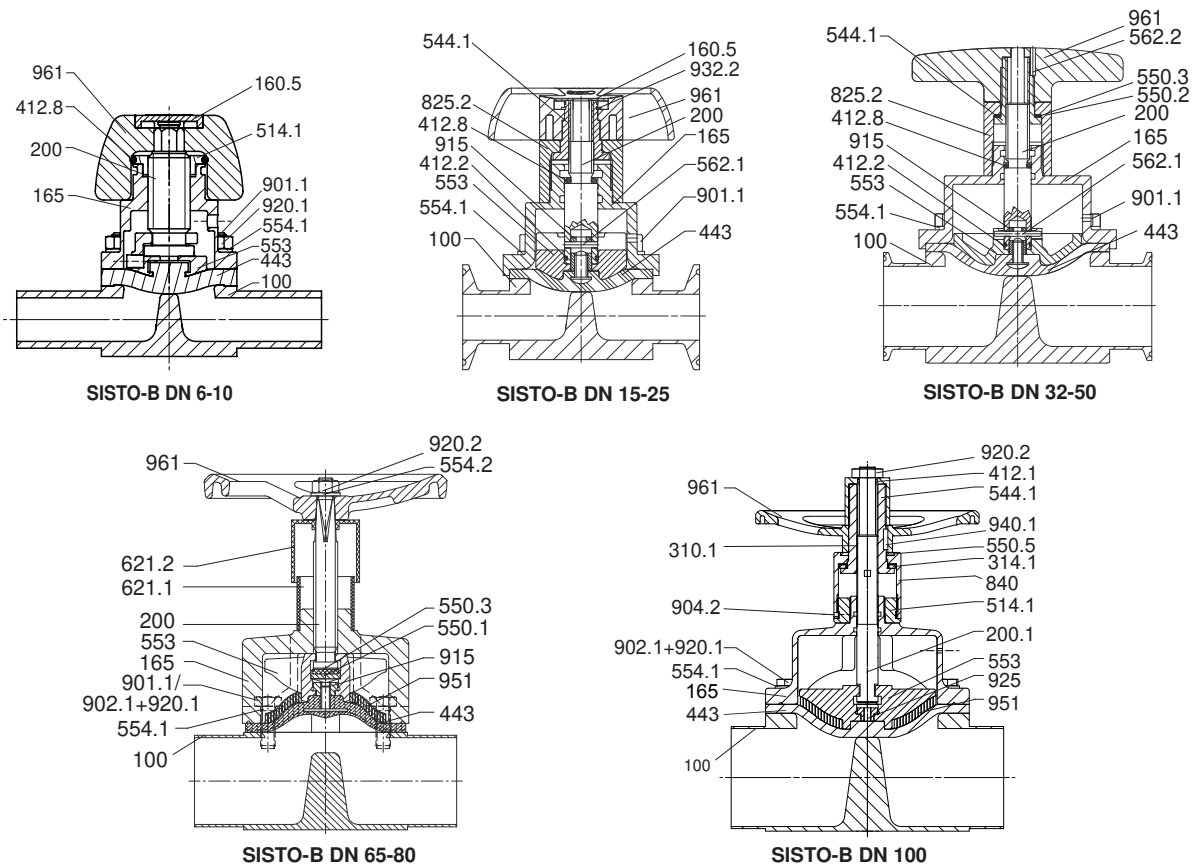
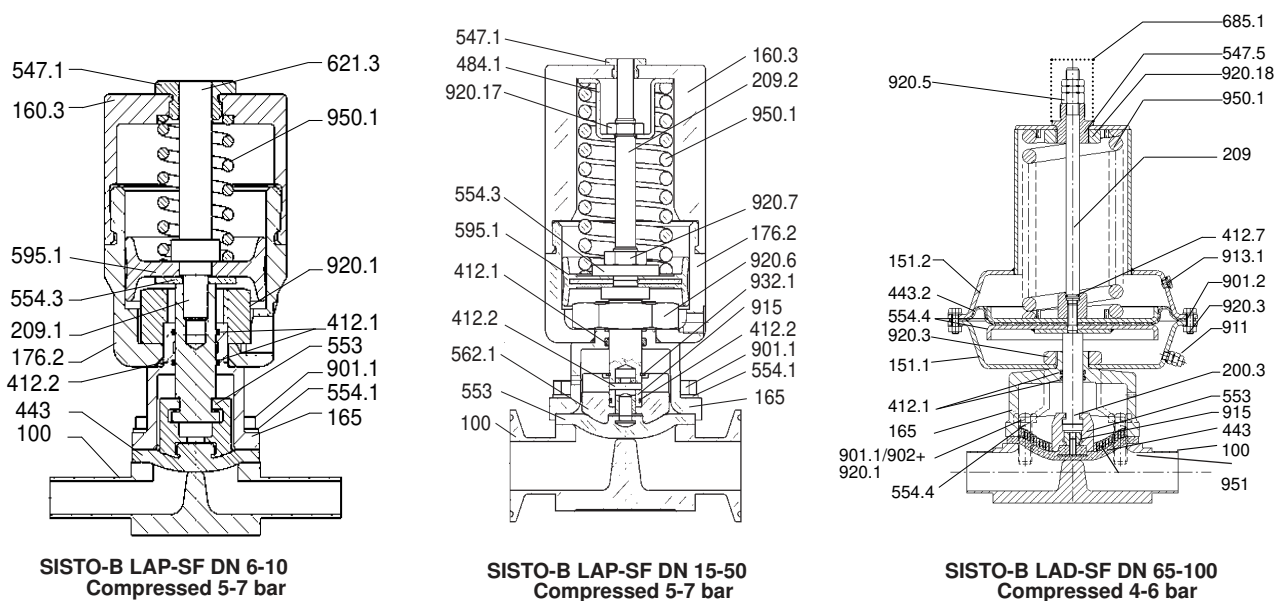
SISTO-B with Handwheel**SISTO-B with mounted LAP-SF/LAD-SF**⁶⁾ Enquire with sisto@ksb.com.

Table 3: List of components

Part No.	Description
100	Body
132.2	Intermediate piece
141.1	Cylinder
151.1	Lower housing section
151.2	Upper housing section
160.3	Cover
160.5	Handwheel cover
160.9	Bearing cover
165	Bonnet
176.2	Bottom end cap
200	Stem
200.1	Stem
200.3	Stem
209.1	Lower piston rod
209.2	Upper piston rod
310.1 ^{7) 9)}	Plain bearing
314.1	Thrust bearing
412.1 ^{7) 9)}	O-ring
412.2	O-ring
412.3	O-ring
412.5	O-ring
412.7 ^{7) 9)}	O-ring
412.8	O-ring
412.12	O-ring
443 ^{7) 8)}	Diaphragm
443.2 ^{7) 8)}	Diaphragm
484.1	Spring plate
514.1	Threaded disc
527.2	Locating sleeve
544.1	Threaded bush
547.1	Guide bush
547.5	Guide bush
550.1	Bearing disc
550.2	PTFE-disc
550.3	Bearing disc
550.5	Identification disc
553	Compressor
554.1	Washer
554.2	Washer
554.3	Washer
554.4	Washer
554.5	Washer

Part No.	Description
562.1	Parallel pin
562.2	Parallel pin
578.1	Spring guide
580.1	Cap
580.2	Cap
580.3	Cap
595.1 ^{7) 9)}	Piston assembly
621.1	Position indicator, lower part
621.2	Position indicator, upper part
621.3	Position indicator
621.5	Position indicator
685.1	Cover
825.2	Adapter
825.3	Adapter
840	Coupling
900.10	Screw
901.1	Hexagon head bolt
901.2	Hexagon head bolt
901.3	Hexagon head bolt
902.1	Stud
904.2	Grub screw
911	Compressed air port
913.1	Vent plug
915	Floating nut
920.1	Nut
920.2	Nut
920.3	Nut
920.5	Nut
920.6	Nut
920.7	Nut
920.17	Nut
920.18	Nut
925	Square nut
926.1	Prevailing torque nut
932.1	Circlip
932.2	Circlip
932.4	Circlip
940.1	Parallel key
950.1	Spring
950.2	Spring
951	Support spiral
961	Handwheel

6.1 Function

Diaphragm valves with pneumatic piston actuator are available in spring-to-close (SF = fail-close), spring-to-open (OF = fail-open) and double-acting (AZ) design.



NOTE

The valves are automatically taken to their fail-safe positions as soon as the control air is intentionally or unintentionally released. The visible moving parts of the valve (both manual and automatic actuation) also serve as position indicators for the valve.

Diaphragm valves for sterile processes are either of the SISTO-C or SISTO-B type.

The valves consist of the pressure-retaining parts, i.e. body [100] and bonnet [165], and the functional unit. The body [100] and actuator or bonnet [165] are connected by hexagon head bolts [901].

The functional unit of diaphragm valves with handwheel [961] consists of the bonnet [165], handwheel [961], stem [200], compressor [553] and the diaphragm [443].

⁷⁾ Recommended spare parts for LAP-SF/OF.

⁸⁾ Recommended spare parts for LAP-SF/OF/AZ.520/.530.

⁹⁾ We recommend having these parts replaced in our factory.

Diaphragm Valves with pneumatic actuator

SISTO-C LAP

The functional unit of SISTO-C diaphragm valves with pneumatic actuator is a pneumatic piston actuator (SF/OF/AZ). The piston actuator consists of the bonnet [165] with a G 1/8" control air port (DIN ISO 228-1), cover [160], compressor [553], piston rod [209], position indicator [621], piston [595.1] and the diaphragm [443].

SISTO-C LAP.520/.530

The functional unit for SISTO-C diaphragm valves with pneumatic actuator is a pneumatic piston actuator (SF/OF/AZ). The piston actuator comprises a bonnet [165] with an M5 control air port for MD30 - MD40 (G1/8 for MD65 - MD202) (ISO 228-1), cover [160.3], compressor [553], piston rod [209], position indicator [621.3], piston [595.1], spring [950.2] and diaphragm [443].

SISTO-B

The functional unit of SISTO-B diaphragm valves with pneumatic actuator is a pneumatic piston actuator (SF/OF/AZ). The piston actuator consists of the bonnet [165] with a G 1/8" control air port (DIN ISO 228-1), compressor [553], piston rod [209], bottom end cap [176.1], cover [160.3], piston [595.1], spring [950.1], spring plate [484.1] and the diaphragm [443].

Manually operated diaphragm valves

SISTO-C HV/ SISTO-B MD30/ ML32

Manually operated diaphragm valves of the SISTO-C HV type series with upper section size MD30 and SISTO-B with upper section size ML32 are fitted with an integrated, adjustable travel stop in closing direction.

The valve is supplied with the travel stop set to establish an overhang X of the compressor [553] in relation to the bonnet [165] (see Figs. 1 or 3) in the closed position. This setting ensures tight shut-off in closed position and protects diaphragm [443] against overloading.

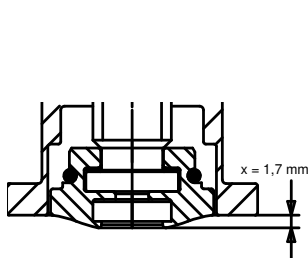


Figure 1: SISTO-B ML32, overhang X in closed position

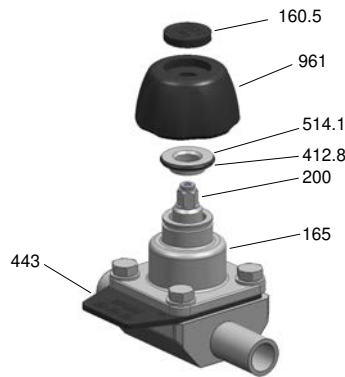


Figure 2: SISTO-C HV, setting the travel stop in closing direction

To change the factory setting:

1. Pull the handwheel [961] together with the cover [160.5] upward and off the stem. Screw the threaded disc [514.1] upwards and remove it.
2. Fit the handwheel [961] again. Set the end position of the valve in closing direction as required.
3. Remove the handwheel [961] again. Screw the threaded disc [514.1] onto the stem [200] by turning it clockwise until it abuts the bonnet [165].
4. Fit an O-ring [412.8] on the threaded disc [514.1]. Then fit the handwheel [961] on the threaded disc and the stem [200] to secure the setting.
5. Mount the cover [160.5] to secure the handwheel [961] on the stem [200] (see Fig. 2).

SISTO-C HV.510/.520 MD30

Manually operated diaphragm valves of the SISTO-C HV.510/.520 type series with upper section size MD30 are fitted with an integrated, adjustable travel stop in closing direction.

The valve is supplied with the travel stop set to establish an overhang X (see Table 4) of the compressor [553] in relation to the bonnet [165] (see Fig. 3) in the closed position. This setting ensures tight shut-off in closed position and protects diaphragm [443] against overloading.

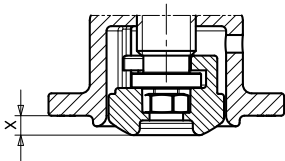


Figure 3: SISTO-C MD30, overhang X in closed position (see Table 4)

Diaphragm Diameter (MD)	Overhang X in closed position (mm)
MD 30	4,1
MD 40	4,8
MD 65	10,2
MD 92	15,7
MD 115	19,2
MD 168	27,2
MD 202	33,0

Table 4: Adjustment dimensions in closed position of the manually operated diaphragm valve SISTO-C HV.510/520

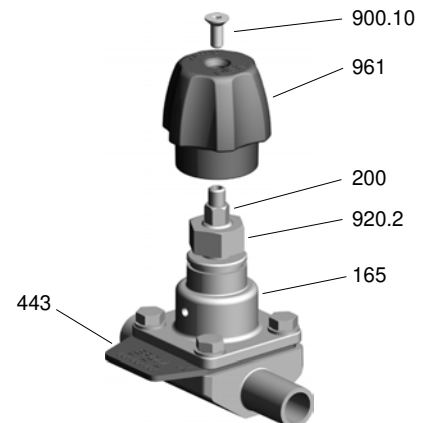


Figure 4: SISTO-C HV.510/.520, setting the travel stop in closing direction

To adjust the travel stop:

1. Remove the screw [900.10]. Remove the handwheel [961]. Screw the nut [920.2] upwards and remove it.
2. Fit the handwheel [961] again. Set the end position of the valve in closing direction as required.
3. Remove the handwheel [961] again. Screw the nut [920.2] onto the stem by turning it clockwise until it abuts the bonnet [165].
4. Fit the handwheel [961] on the nut [920.2] and the stem [200] to secure this setting.
5. Screw in the screw [900.10] to secure the handwheel [961] on the stem [200] (see Fig. 4).

SISTO-C HV.510/.520 MD40 - MD115

Manually operated diaphragm valves of the SISTO-C HV.510/.520 type series with upper section size MD40-MD115 are fitted with integrated, adjustable travel stops in closing direction and opening direction.

The valve is supplied with the travel stop set to establish an overhang X of the compressor [443] in relation to the bonnet [165] (see Fig. 5) in the closed position. This setting ensures tight shut-off in closed position and protects diaphragm [443] against overloading. The travel stop in opening direction is factory-set to full valve travel. In this position, the cylindrical section of the locating sleeve [527.2] is flush with the upper edge of the handwheel [961] (see Fig. 6).

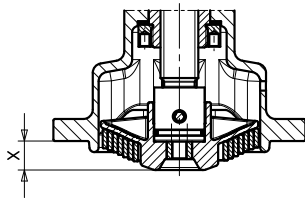


Figure 5: SISTO-C MD40-MD115
Overhang X in closed position

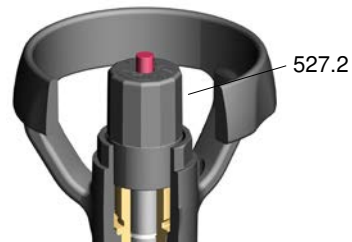


Figure 6: Setting the travel stop in opening direction

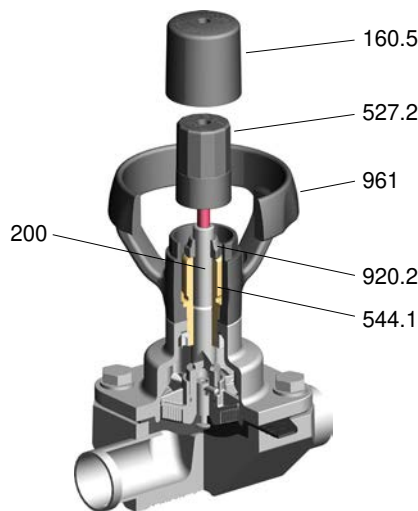


Figure 7: SISTO-C HV.510/.520
Setting the travel stop in closing direction

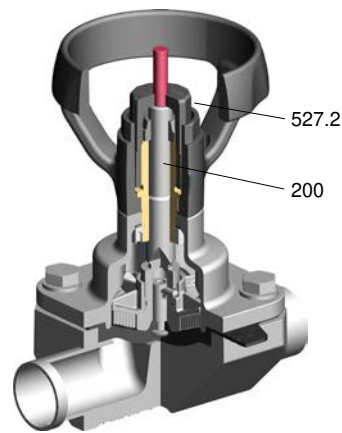


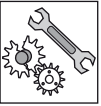
Figure 8: SISTO-C HV.510/.520
Setting the travel stop in opening direction

To adjust the factory-set travel stop in closing direction:

1. Remove the cover [160.5]. Screw the locating sleeve [527.2] upwards and remove it.
2. Screw the nut [920.2] upwards until the required end position of the valve in closing direction can be set.
3. Then screw the nut [920.2] downwards on the stem [200] by turning it clockwise until it abuts the threaded bush [544.1].
4. Screw on the locating sleeve [527.2] until the cylindrical section is flush with the upper edge of the handwheel.
5. Mount the cover [160.5] on the handwheel [961] and the locating sleeve [527.2] to secure this setting (see Fig. 7).

To adjust the factory-set travel stop in opening direction:

1. Take the valve to the required position. Turn the locating sleeve [527.2] clockwise until it abuts the stem [200] (see Fig. 8).
2. If applicable, observe the note on the locating sleeve [527.2] regarding the travel adjustment per turn.
3. Mount the cover [160.5] on the handwheel [961] and the locating sleeve [527.2] to secure this setting.

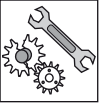
	ATTENTION
	<p>This sequence must be observed:</p> <ol style="list-style-type: none"> 1. Set the travel stop in closing direction. 2. Set the travel stop in opening direction.


6.2 Installation


6.2.1 General information/ Safety regulations


Responsibility for positioning and installing the valves or the pneumatic actuators always lies with the engineering company, construction company or operator/user.

Planning and installation errors may impair the reliable function of the valves and pose a substantial safety hazard. Compliance with the following requirements is of particular importance:

	ATTENTION
	<p>The piping shall be laid in such a way as to prevent detrimental thrust and torsional forces from being transmitted to the valve bodies in installed and operating condition, to avoid impairment of valve function and/or valve rupture.</p>


	NOTE
	<p>The caps on the connection ports shall be removed immediately prior to installation.</p>

	NOTE
	<p>Do not paint any parts which are relevant to the function of the valve, such as moving stems and position indicator [621] components. Do not use valve handwheels [961] as footholds.</p>

	WARNING
	<p>For safety reasons, valves and piping systems operated at high (>+50 °C) or low (<0 °C) temperatures must be insulated, or a warning sign must point out the risk of personal injury involved when touching the hot or cold components.</p>

In keeping with German energy-saving regulations (EnEV) we recommend that valves handling warm fluids should be insulated to save energy.

Valves with external moving elements must be fitted with protective covers, or other suitable measures must be taken to prevent accidents.

	WARNING
	<p>Valves used as dead-end valves in a pipeline should be protected against unauthorised or unintentional opening. This applies especially in abnormal operating conditions. If this is not complied with, escaping fluid handled could lead to injuries and even danger to life.</p>

6.2.2 Installation position

The diaphragms [443] are marked with an arrow indicating flow direction. The valves must be installed such that the flow direction of the fluid corresponds to the direction shown by the arrow on the valve. If no directional arrow is indicated on the valve, the valve can be installed in any position.

6.2.3 Diaphragm valves

Diaphragm valves can be installed in any position. However, the best installation position is with the stem pointing vertically upwards. It is recommended to install SISTO-C 2-way valves in the appropriate self-draining angle (please refer to type series booklet SISTO-C (8644.1) or SISTO catalogue "Sterile processes" (8652.10)).

6.2.4 Special designs

For positioning and installing special valve designs please contact the consultant, construction company or operator


6.2.5 Insulation


If the valve is to be insulated, make sure that the insulation does not impair the function of the valve.


6.3 Installation instructions

6.3.1 Welding instructions

Responsibility for welding the valves into the piping and for any heat treatment required lies with the commissioned company or the plant operator.

	<p>ATTENTION</p> <p>When welding valves with butt weld ends into the piping or when performing welding jobs on a pipeline after the valves have been installed (pipeline installation) make sure that no contamination enters the valve body, to prevent damage to linings or diaphragms [443].</p>
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	<p>NOTE</p> <p>When welding the valve into the pipeline, take special precautions e.g. welding in several steps and at high welding speed, so that the temperature rise in the middle of the valve body [100] does not exceed the max. permissible operating temperature. The upper valve section including diaphragm [443] must be removed prior to welding the valve body [100] into the piping.</p>
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	<p>ATTENTION</p> <p>To prevent scorching, welding cables must not be attached to valves whose functional valve elements or valve surface have to meet specific roughness requirements.</p>
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6.4 Commissioning/Start-up/Shutdown

(Please also refer to Section 6.2, Installation)


6.4.1 General

Prior to commissioning/start-up compare the material, pressure and temperature data on the valves with the operating conditions of the piping to check the material's chemical resistance and stability under load.

	<p>ATTENTION</p> <p>Surge pressures, which might occur, must not exceed the max. permissible pressure. Safety measures are required to be taken by the operator.</p>
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In new systems and particularly after repair, the complete piping system must be thoroughly flushed with the valves fully open so that particles and/or welding beads that might damage the valves are removed.

The responsibility for the media and method used for cleaning the piping system lies with the party carrying out the cleaning.

	<p>CAUTION</p> <p>Risk of injury!</p> <p>Venting the valve by undoing, e.g., the bonnet/cover bolting is dangerous and therefore not permitted. To prevent damage to the valve material or joint seals, the usual start-up and shutdown velocities must be adhered to.</p>
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6.4.2 Valve actuation

Viewed from above, the manually operated valves are closed by turning the handwheel [961] in clockwise direction, and opened by turning the handwheel [961] in anti-clockwise direction. Valve variants which deviate from this rule are marked accordingly.


	<p>ATTENTION</p> <p>Valves with handwheels must only be actuated by hand. As the valve can be damaged by applying excessive force, the use of levers for turning the handwheel [961] is not allowed.</p>
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Shut-off valves are normally used in such a way that they are either fully open or fully closed.

If, while opening or closing the valve, a resistance can be felt, the valve is in its final position and the operation must be stopped. Continued actuation may result in increased wear of the valve.

6.4.3 Functional check prior to commissioning

Check the shut-off function of the installed valve prior to commissioning/start-up by opening and closing it several times. If required, evenly re-tighten the body [100] / bonnet [165] bolting as well as the bolting at the mating flanges (see Section 6.8).

	<p>ATTENTION</p> <p>Prevent jamming!</p> <p>Before re-tightening the body [100]/bonnet [165] bolting open the valve by two full handwheel turns to prevent jamming.</p>
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6.4.4 Shutdown

In the event of prolonged shutdowns, SISTO Armaturen S.A. recommends draining from the piping fluids which change their physical condition due to changes in concentration, polymerisation, crystallisation, solidification, etc. If required, flush the piping with the valves fully opened.

6.5 Servicing/Maintenance

6.5.1 Safety regulations

Servicing and maintenance work must only be performed by competent personnel taking into account the relevant health and safety regulations. It is imperative that the below safety instructions and the general information on safety as per Section 2, Safety, be observed for all servicing and maintenance work to be performed at the valves.


	<p>ATTENTION</p> <p>Always use suitable spare parts and tools to ensure proper functioning of the valve.</p>
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6.5.2 Dismantling of valves

Before removing the complete valve from the pipe, or before repair or maintenance work on the valve itself, i.e.

- before undoing the flange bolting between the valve and the pipe
- before removing the bonnet [165]
- before removing any drain or vent plugs

valve pressure must be released and the valve must be allowed to cool down such that the temperature is below the fluid's vaporisation temperature in all areas in contact with the fluid in order to effectively prevent any risk of scalding.

	<p>DANGER</p> <p>Risk of injury from valve under pressure!</p> <p>Never open a valve under pressure (danger to life)! If toxic or easily inflammable fluids were handled or fluids whose residues may cause corrosion when coming into contact with atmospheric humidity, drain the valve and flush or vent it. If required, wear personal safety equipment!</p>
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Depending on the installation position, fluid residues may be left in the valve; these must be collected and properly disposed of. Prior to any transport, flush and drain the valve thoroughly.

If you have any questions please contact the manufacturer.

6.5.3 Maintenance

All components of the manually operated and pneumatically actuated valves have been designed to be largely maintenance-free. The materials of the sliding parts have been selected for minimum wear.

On any diaphragm valve, the diaphragm [443] is the highest stressed component. The diaphragm [443] is not only subjected to mechanical stress but also to wear caused by the fluid handled. We recommend to regularly check the diaphragm [443] at intervals to be individually stipulated depending on service conditions and actuation frequency and replace them if required.

- To check the diaphragm [443], remove the bonnet from the valve body. See Section 6.6, „Replacing the diaphragm“.

We recommend to regularly check these wear parts at intervals to be individually stipulated depending on service conditions and actuation frequency and replace them if required.

The operator/user is responsible for fixing appropriate inspection and servicing intervals as required by the service conditions of the valves.

The service life of the valves can be prolonged by:

- actuating the valve (open-close) at least once or twice a year to check its function,
- and
- lubricating the movable parts with standardised lubricants to DIN 51825 which are suitable for the application of the valve.

The safety instructions in Sections 2, 6.5.1 and 6.5.2 shall be observed.

6.6 Replacing the diaphragm

6.6.1 Replacing the diaphragm of SISTO-C

1. Take the valve to the open position.
2. Undo the hexagon head bolts [901.1] to dismantle the bonnet [165].
3. Take the valve to the closed position:
 - For manually operated valves turn the handwheel [961] clockwise.
 - “Fail-open” (OF) actuator and “double-acting actuators” (AZ): Apply compressed air to the upper control air port.
 - “Fail-close” (SF) actuator: Release the actuator pressure.
4. Turn diaphragms [443] with fastening thread anti-clockwise to dismantle. Diaphragms [443] marked “MD 30” and “MD 40” with an “N” added after the indication of the elastomer quality and featuring a fastening button on the back are buttoned into the compressor [553] by means of this button. Simultaneous pulling and turning on one side will easily remove the diaphragm [443] from the compressor [553].

Proceed as follows to fit the new diaphragm [443]:

1. The contact surfaces of the diaphragm [443] inside the body [100] and the bonnet [165] must be clean and dry.
2. Take the upper valve section with the bonnet [165] to the closed position as described above. (close manually actuated upper valve sections by turning the handwheel [961] in clockwise direction).
3. On valves with support spiral [951] make sure to place the support spiral [951] into the bonnet [165] and verify that the last winding of the support spiral [951] protrudes beyond the sealing lip. The last winding of the support spiral [951] must not end on a compressor [553] ridge.
4. Remove any protection from the fastening grub screw of the diaphragm [443].
5. Screw in the diaphragm [443] as far as it will go, i.e. until it rests against the compressor [553], then back it off by a maximum of 180° to ensure it is correctly aligned.
6. Once the diaphragm [443] rests against the compressor [553], never screw it in further to avoid overloading of the diaphragm [443].
7. The upper valve section must be taken to the open position before the bonnet [165] is fitted:
 - “Fail-close” (SF) actuator and “double-acting actuators” (AZ): Apply compressed air to the lower control air port.
 - “Fail-open” (OF) actuator: Release the actuator pressure.
8. On handwheel-actuated valves, turn the handwheel [961] in anti-clockwise, i.e. opening, direction until the heat barrier of the diaphragm [443] rests against the bonnet [165]. Do not turn any further.
9. Always make sure that the arrow on the protruding identification tongue of the diaphragm [443] points in the flow direction of the valve seat. This requirement must be met for the valve to provide reliable shut-off. The diaphragm [443] must not be fitted with the arrow pointing at right angles to the flow direction, i.e. parallel to the weir inside the body [100].
10. Now place the bonnet [165] onto the body [100] and tighten the bonnet [165] fastening bolts by hand.
11. Manually operated valve: Tighten the bonnet bolts evenly and crosswise in accordance with the tightening torques table.
12. Actuated valves (SF/OF/AZ): Run the actuator to the closed position. Tighten the bonnet bolts evenly and crosswise in accordance with the tightening torques table. Then run the actuator to the open position. Verify the tightening torques of the bonnet bolts.

The required torques are given in Section 6.8.

5.6.2 Replacing the diaphragm of SISTO-B

1. Take the valve to the open position.
2. Undo the hexagon head bolts [901.1] to dismantle the bonnet [165].
3. Take the valve to the closed position:
 - Manually operated valves: Turn the handwheel [961] clockwise.
 - “Fail-open” (OF) actuator and “double-acting actuators” (AZ): Apply compressed air to the upper control air port.
 - “Fail-close” (SF) actuator: Release the actuator pressure.
4. If the diaphragm [443] features a fastening thread, turn it anti-clockwise to remove it. Diaphragms featuring a fastening button on the back of the diaphragm are buttoned into the compressor [553] by means of this button. Simultaneous pulling and turning on one side will easily remove the diaphragm from the compressor.

Proceed as follows to fit the new diaphragm [443]:

1. The contact surfaces of the diaphragm [443] inside the body [100] and the bonnet [165] must be clean and dry.
2. Take the upper valve section with the bonnet [165] to the closed position as described above. (Close manually actuated upper valve sections by turning the handwheel [961] in clockwise direction).
3. On valves with spiral-supported diaphragm, make sure to place the support spiral [951] into the bonnet [165] and verify that the last winding of the support spiral [951] protrudes beyond the sealing lip. The last winding of the support spiral must not end on a compressor [553] ridge.
4. Remove any protection from the fastening grub screw of the diaphragm [443].
5. Screw in the diaphragm [443] as far as it will go, i.e. until it rests against the compressor [553], then back it off by a maximum of 180° to ensure it is correctly aligned.
6. Once the diaphragm rests against the compressor [553], never screw it in further to avoid overloading of the diaphragm [443].
7. The upper valve section must be taken to the open position before the bonnet [165] is fitted:
 - “Fail-close” (SF) actuator and “double-acting actuators” (AZ): Apply compressed air to the lower control air port.
 - “Fail-open” (OF) actuator: Release the actuator pressure.
8. On handwheel-actuated valves, turn the handwheel [961] in anti-clockwise, i.e. opening, direction until the diaphragm [443] rests against the bonnet [165]. Do not turn any further.
9. Now place the bonnet [165] onto the body [100] and tighten the bonnet [165] fastening bolts by hand.
10. Manually operated valve: Tighten the bonnet bolts evenly and crosswise in accordance with the tightening torques table.
11. Actuated valves (SF/OF/AZ): Run the actuator to the closed position. Tighten the bonnet bolts evenly and crosswise in accordance with the tightening torques table. Then run the actuator to the open position. Verify the tightening torques of the bonnet bolts.

The required torques are given in Section 6.8.

6.6.3 Fitting multi-part PTFE and TFM diaphragms with backing rings

The metal backing ring used for multi-part diaphragms must be aligned such that its grooved face rests against the back of the plastic diaphragm. Mounted in this way, the ring's smaller face will point towards the bonnet flange.

6.7 Valve reassembly

Valve reassembly shall be effected in reverse order to dismantling. To maintain functional reliability, new sealing elements shall be used whenever the valve is reassembled.

After reassembly and prior to commissioning/start-up, the valves must be subjected to a leak test to DIN EN 12266.

6.8 Tightening torques (Nm) of bonnet/cover bolting

(Tightening torques only apply to the valve's temperature range between +5°C and +40°C)

SISTO-C

Table 5: Tightening torques SISTO-C

Diaphragm	Diaphragm diameter (MD)							
	30	40	65	92	115	168	202	280
<i>EPDM</i>	1,5	3	8	12	14	18	32	40
<i>TFM-foil bonded</i>	1,5	3,5	8	12	18	-	-	-
<i>TFM (2-layer)</i>	2	4	10	18	30	40	60	75

SISTO-B

Table 6: Tightening torques SISTO-B


Diaphragm	Diaphragm length (ML)												
	32	46	52	58	67	82	90	108	132	158	226	260	304
<i>EPDM</i>	0,8	3,5	2,5	6	8	12	15	25	30	45	30	35	50
<i>TFM-foil bonded</i>	1	4	2,5	7	9	13	17	26	-	-	-	-	-
<i>TFM (2-layer)</i>	-	6	-	8	10	15	18	28	35	50	35	40	55

7 Trouble-shooting

7.1 General

The manually operated and pneumatically actuated valves made by SISTO Armaturen S.A. are robust in design. Nevertheless, malfunctions e.g. caused by maloperation, lack of maintenance or improper use cannot be ruled out completely.

All repair and maintenance work shall be performed by competent personnel using suitable tools and original spare parts.

	WARNING
	<p>Risk of injury ! Improper remedial work on the valve.</p> <p>For any work performed in order to remedy faults on the valve observe the relevant information given in this operating manual.</p>

We recommend to have this work performed by our service personnel.

If you have any questions please contact the manufacturer.

7.2 Trouble-Shooting

Table 7: Trouble-Shooting

Problem	Possible cause	Remedy
Leakage at the mating flanges.	<ul style="list-style-type: none"> • Contaminations/solids in the fluid. • Erosion, corrosion, abrasion. • Excessive loads from pipeline forces or thermal stresses. 	<ul style="list-style-type: none"> • Dismantle, clean • Replace sealing elements.
Leakage at the body [100]/bonnet [165] bolting.	<ul style="list-style-type: none"> • Compressive-stress relaxation. • Gasket has settled as a result of high temperature fluctuations. • Impermissible pressure loads. • Poor maintenance. • Deterioration of sealing elements due to poor resistance to temperature or fluid handled. 	<ul style="list-style-type: none"> • Re-tighten the hexagon head bolts [901.1] at the bonnet/cover.
Leakage at the stem neck/leakage indication hole caused by diaphragm rupture.	<ul style="list-style-type: none"> • Ruptured diaphragm [443]. 	<ul style="list-style-type: none"> • Replace the defective diaphragm [443], see Section 6.6 „Replacing the diaphragm“.
Seat leakage.	<ul style="list-style-type: none"> • Foreign matter at the weir. 	<ul style="list-style-type: none"> • Remove foreign matter from the weir and replace diaphragm [443] if necessary.
	<ul style="list-style-type: none"> • Foreign matter in/on the diaphragmlip or damage. 	<ul style="list-style-type: none"> • Remove foreign matter in/at the diaphragm lip and replace diaphragm [443] if necessary.
	<ul style="list-style-type: none"> • Stop nut [920] for closed position incorrectly adjusted. 	<ul style="list-style-type: none"> • Re-adjust stop nut [920] or replace diaphragm [443] if necessary.

8 Mounting and installing accessories for LAP.520/.530 pneumatically actuated valves

If a SISTO-C accessory has been ordered as a unit together with a valve, the corresponding accessory will be supplied mounted on the valve. In the case of any deviations contact SISTO Armaturen S.A.

8.1 Mechanical travel stop for LAP.520/.530 in opening direction

For use with:

Actuated valves SISTO-C: S-C LAP.520 SF/OF/AZ MD 30 - 65 (Fig. 10)
S-C LAP.520 SF/OF/AZ MD 92 - 115 (Fig. 11)
S-C LAP.520/.530 SF/OF/AZ MD 168 - 202 (Fig. 12)

Purpose:

Travel stop for pneumatically actuated valves in opening direction.

Mounting:

For a correct setting of the travel stop the valve bonnet with the diaphragm must be mounted on the body as described in operating manual 0570.821.

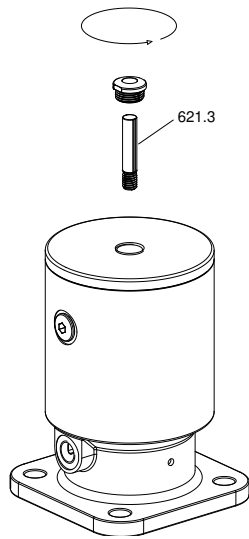


Figure 9: Removing the cap and position indicator, LAP.520/.530

For retrofitting the travel stop on the valve carry out steps 1 - 3.

1. Remove the plastic cap of the actuator with an open-ended spanner (WAF13/WAF21). Unscrew and remove the position indicator [621.3].
2. Screw the position indicator [621.4] of the travel stop into the piston rod of the valve.
3. Screw the travel stop assembly [544.2/904.1] into the thread of the actuated valve. Tighten it to a torque of 50 Nm (MD 30 - 115)/100 Nm (MD 168 - 202).

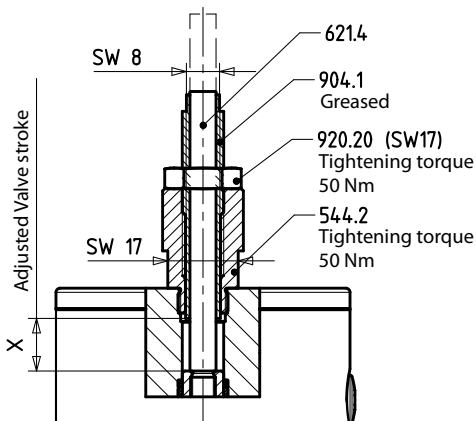


Figure 10: Travel stop in opening direction, MD 30 - 65

Adjusting the travel stop:

4. Move the actuator into closed position.
5. Undo the locknut [920.20].
6. Screw the grub screw [904.1] into the actuator as far as it will go. The set valve stroke equals 0 mm when the actuated valve is mounted on a body with diaphragm.
7. Adjust the valve stroke as required by unscrewing the grub screw in accordance with the table (Table 8) below. (Intermediate values can be derived by linear interpolation.) Check the final value of the stroke.
8. Fasten the grub screw [904.1] and tighten the locknut [920.20] to a tightening torque of 50 Nm (MD 30 - 115)/100 Nm (MD 168 - 202).

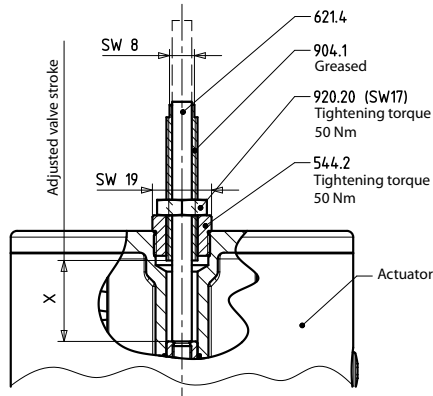


Figure 11: Travel stop in opening direction, MD 92 - 115

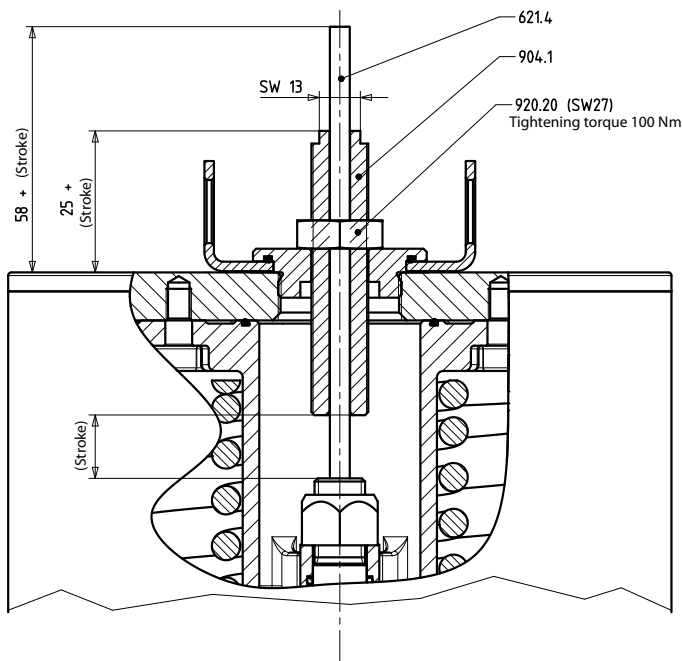


Figure 12: Travel stop in opening direction, MD 168 - 202

The position indicator [621.4] of the travel stop is delivered in maximum length and is often not flush with the grub screw [904.1] in closed position.

To make the closed position more visible, the protruding part of the position indicator can be marked with a band or pen in closed position. Alternatively, the position indicator [621.4] can be shortened, so it is flush with the grub screw in closed position.

Table 8: Valve stroke settings in open position, LAP.520 MD30-65

Diaphragm Diameter (MD)	Max. Valve stroke (mm)	Turns from closed position				
		100 %	80 %	60 %	40 %	20 %
MD 30	5	3,3	2,7	2,0	1,3	0,7
MD 40	7	4,7	3,7	2,8	1,9	0,9
MD 65	13	8,7	6,9	5,2	3,5	1,7
MD 92	21	14,0	11,2	8,4	5,6	2,8
MD 115	24	16,0	12,8	9,6	6,4	3,2
MD 168	45	45,0	36,0	27,0	18,0	9,0
MD 202	60	60,0	48,0	36,0	24,0	12,0

8.2 Mechanical travel stop for LAP.520/.530 in closing direction

For use with:

Actuated valves SISTO-C: S-C LAP.520 SF/OF/AZ MD 30 - 115 (Fig. 13)
S-C LAP.520/.530 SF/OF/AZ MD 168 - 202 (Fig. 14)

Purpose:

Travel stop for pneumatically actuated valves in closing direction.



WARNING

Risk of crushing through moving parts!

Without protecting tube [141] risk of injury by moving components.
The valve must only be operated when the protecting tube [141] is fitted.

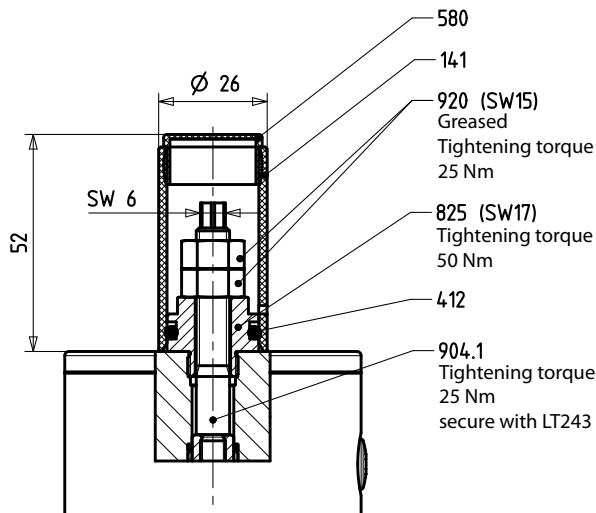


NOTE

The travel stop assembly is not available as a separate item; it can only be obtained in combination with the valve bonnet. It cannot be retrofitted by the customer.

Mounting:

For a correct setting of the travel stop the valve bonnet with the diaphragm must be mounted on the body as described in the operating manual.



1. Remove the protecting tube [141].

Adjusting the travel stop:

2. Loosen both locknuts [920], so the bottom locknut is free.
3. Move the actuator into closed position.
4. Position the nuts [920] to allow the required stroke. Then lock them to a tightening torque of 25 Nm/120 Nm.
5. Fit protecting tube [141] again.

Figure 13: Travel stop in closing direction, MD 30 - 115
(at the example of MD 65)

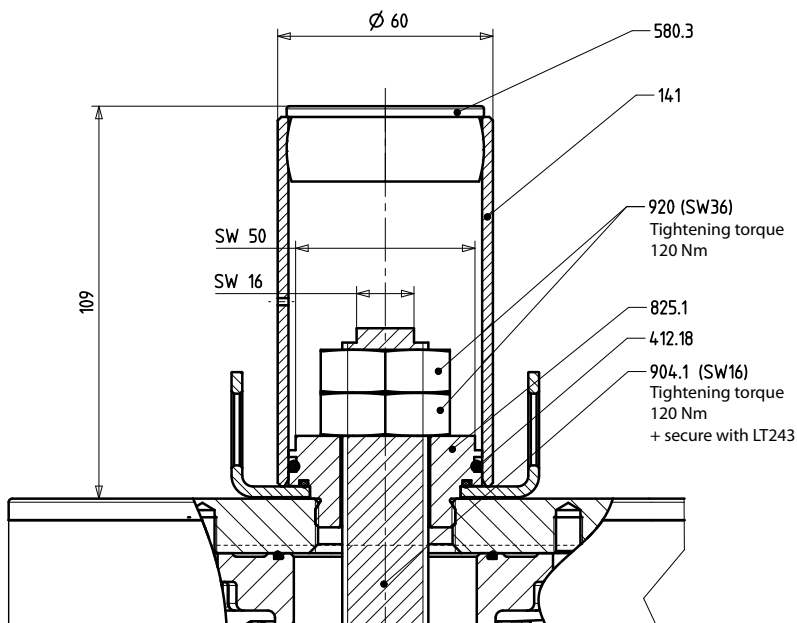


Figure 14: Travel stop in closing direction, MD 168 - 202


8.3 SK.500/.510 electrical actual-position feedback unit with inductive limit switch for SISTO-C LAP.520/.530

For use with:

Actuated valves SISTO-C: S-C LAP.520 SF/OF/AZ MD 30 - 115 (Fig. 13)
S-C LAP.520/.530 SF/OF/AZ MD 168 - 202 (Fig. 14)

Purpose:

Electrical position detection for pneumatically actuated valves via limit switch.

	NOTE
	The proximity sensors must be (factory) set to be damped in intermediate position.

Mounting:

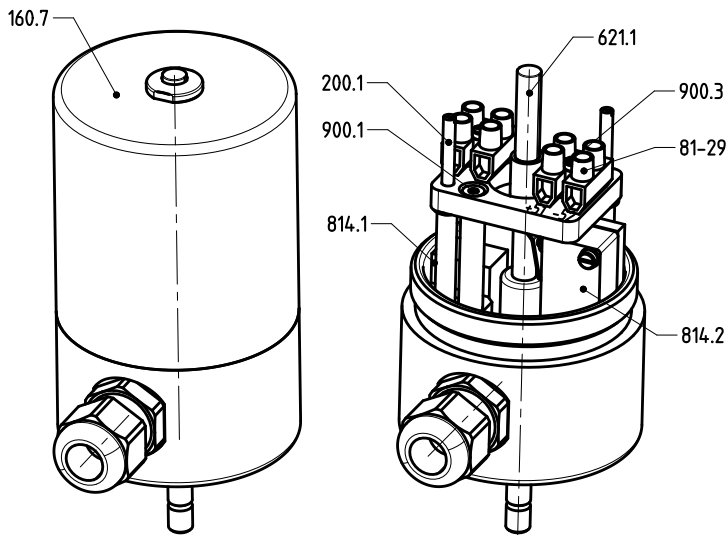


Figure 15: Design of actual-position feedback unit

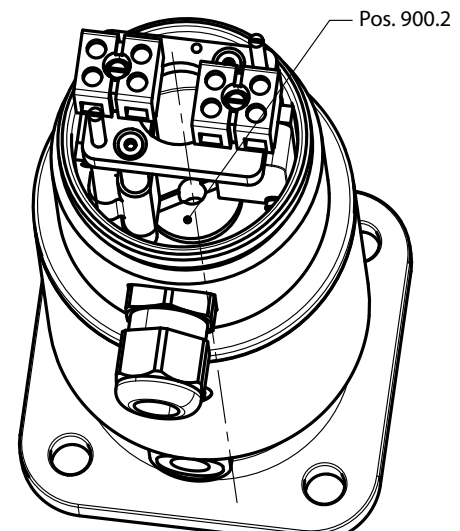



Figure 16: Fastening of actual-position feedback unit

Adjusting the actual-position feedback unit when supplied with the actuator:

1. Unscrew and remove the cover [160.7] (Fig. 15).
2. The fine adjustment of the limit switches [814.1/814.2] can be made by turning the threaded stem [200.1] with a screwdriver.
3. Screw the cover [160.7] back on.
4. Check the switching function.

	NOTE
	For retrofitting an actual-position feedback unit indicate the valve size and actuator size in the order.

To be able to set the accessories correctly the valve bonnet with the diaphragm must be installed on the body in accordance with the operating manual.

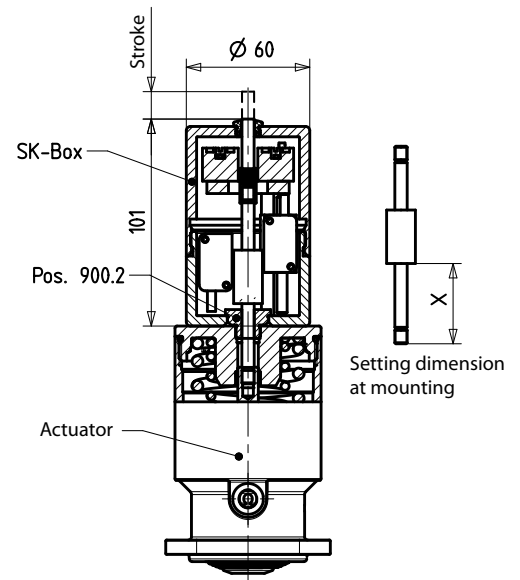
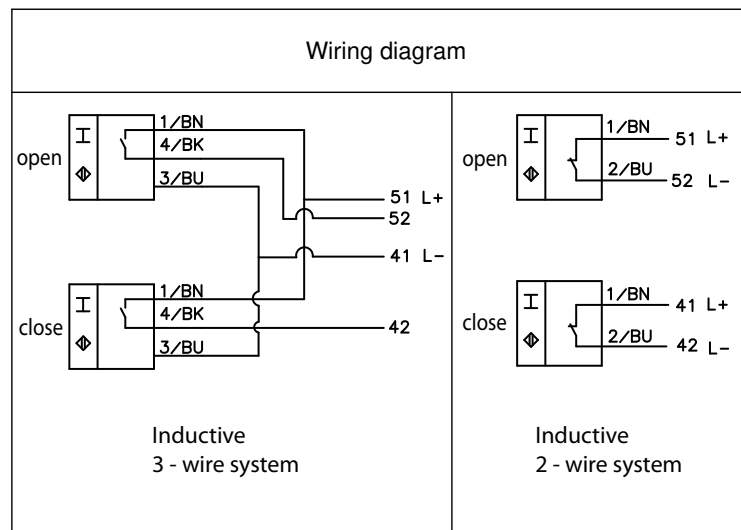
For retrofitting the actual-position feedback unit carry out the following steps:

1. Remove the plastic cap of the actuator with an open-ended spanner (WAF13/WAF21). Unscrew the position indicator (Fig. 9, Section 8.1).
2. Unscrew and remove the cover [160.7] (Fig. 15).
3. Undo and remove the fastening screws of the terminals [81-29].
4. Remove the position indicator assembly [621.1].
5. Adjust distance X of the switching flag of the position indicator assembly [621.1] in accordance with Table 9.
6. Apply one drop of Loctite 243 to the thread of the fastening screw [900.2] of the limit switch box. Fasten it to the actuator and tighten it with a screwdriver (Fig. 16).
7. Apply Loctite 243 to the thread of the position indicator assembly [621.1]. Screw it into the piston rod of the actuator. (Thread-locking agent Loctite 243 is not included in the scope of supply).
8. Fasten the terminals [81-29] with screws again.
9. The fine adjustment of the limit switches [814.1/814.2] can be made by turning the threaded stem [200.1] with a screwdriver.
10. Screw the cover [160.7] back on.
11. Check the switching function.

Factory setting for the limit switches: damped for the entire travel distance, undamped in end position.

Table 9: Setting dimensions SK.500/.510

Box	Diaphragm Diameter (MD)	Actuator (mm)	Dimension X (mm)	Stroke (mm)	Fastening thread Part No. 900.2 (mm)
SK.500	MD 30	K35	39	5	M12x1
		K40			
	MD 40	K40	39	7	M12x1
		K50			
	MD 65	K63	39	13	M12x1
		K80			
MD 92	K80	57	21	M18x1	
	K100				
	K160				
MD 115	K100	57	24	M18x1	
	K160				
SK.510	MD 168	K160	92	40	M18x1
		K200			
	MD 202	K200	92	55	M18x1
		KD200			

**Figure 17:** Design of an SK.500/.510**Figure 18:** Scheme wiring diagram

8.4 SK.500/510 electrical actual-position feedback unit with inductive limit switch and travel stop for SISTO-C LAP.520/.530 in opening direction

For use with:

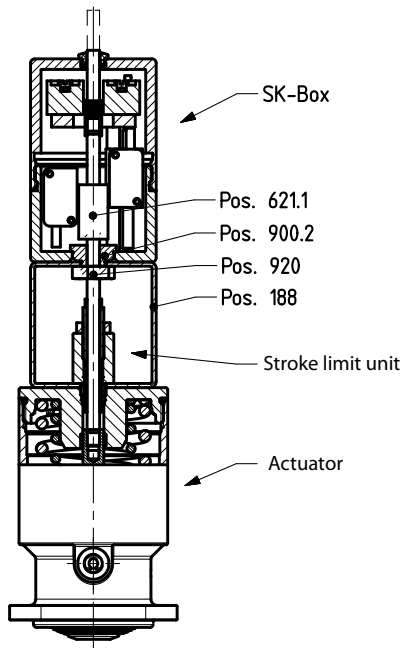
Actuated valves SISTO-C:	S-C LAP.520 SF/OF/AZ MD 30 - 65
	S-C LAP.520 SF/OF/AZ MD 92 - 115
	S-C LAP.520/.530 SF/OF/AZ MD 168 - 202

Purpose:

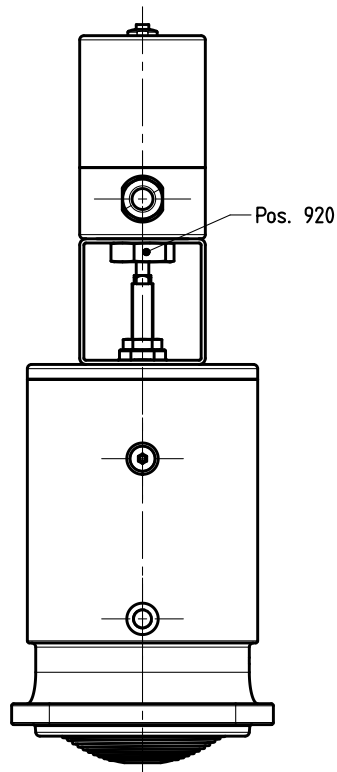
Electrical position detection for pneumatically actuated valves via limit switch and travel stop of pneumatically actuated valves in closing direction.

Mounting:

SK.500 (MD30-65)



SK.500 (MD92-115)



SK.510 (MD168-202)

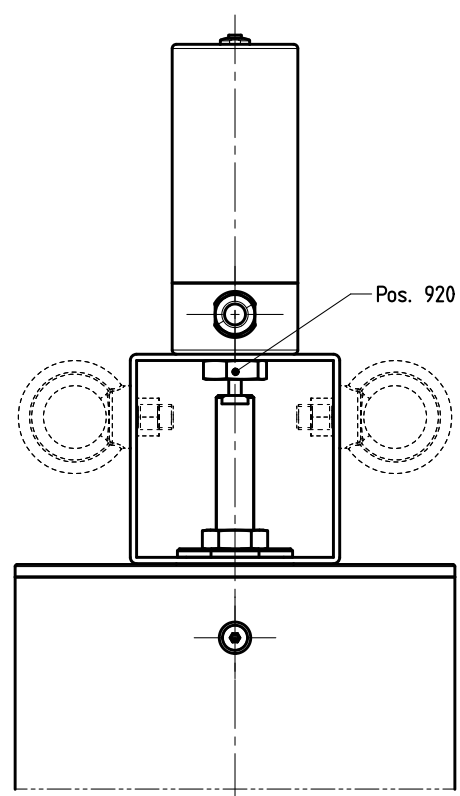


Figure 19: Design of travel stop and actual-position feedback unit

To be able to make the correct accessory settings the valve bonnet with the diaphragm must be mounted on the body in accordance with the operating manual.

Setting the travel stop and actual-position feedback unit when supplied with the actuator:

Setting the travel stop: see Section 8.1.

Setting the actual-position feedback unit: see Section 8.3.

For retrofitting the actual-position feedback unit carry out the following steps:

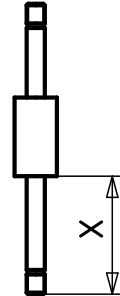
1. Remove the plastic cap of the actuator with an open-ended spanner (WAF13/WAF21). Unscrew the position indicator (Fig. 9, Section 8.1).
2. Place the fixing plate [188] on the valve. Screw the travel stop assembly into the thread of the actuated valve. Tighten it to a tightening torque of 50 Nm (MD 30 - 115) or 100 Nm (MD 168 - 202).
3. Setting the travel stop: see Section 8.1.
4. Unscrew and remove the cover [160.7] (Fig. 15, Section 8.3).
5. Undo and remove the fastening screws of the terminals [81-29].
6. Remove the position indicator assembly [621.1].
7. Adjust distance X of the switching flag of the position indicator assembly [621.1] in accordance with Table 10.
8. Place the limit switch box on the fixing plate [188]. Apply one drop of Loctite 243 to the thread of the fastening screw [900.2] and tighten the screw with a screwdriver (Fig. 19).
9. Apply Loctite 243 to the thread of the position indicator assembly [621.1]. Screw it into the piston rod of the actuator. (Thread-locking agent Loctite 243 is not included in the scope of supply).
10. Screw the terminals [81-29] back on (Fig. 15, Section 8.3).
11. Perform fine adjustment of the limit switches [814.1/814.2] by turning the threaded stem [200.1] with a screwdriver.
12. Screw the cover [160.7] back on.
13. Check the switching function.

**NOTE**

Optionally for valve sizes MD168-202/SK.510 the supplied eyebolts can be used for lifting.

Table 10: Setting dimensions SK.500/510 and travel stop

Box	Diaphragm Diameter (MD)	Actuator (mm)	Dimension X (mm)	Stroke (mm)	Fastening thread Part No. 900.2 (mm)
SK.500	MD 30	K35	99	5	M12x1
		K40			
	MD 40	K40	99	5	M12x1
		K50			
	MD 65	K63	99	13	M12x1
		K80			
MD 92	K80	117	21	M18x1	
	K100	124			
	K160				
MD 115	K100	117	24	M18x1	
	K160	194			
SK.510	MD 168	K160	192	45	M18x1
		K200			
	MD 202	K200	192	60	M18x1
		KD200			



Setting dimension at mounting

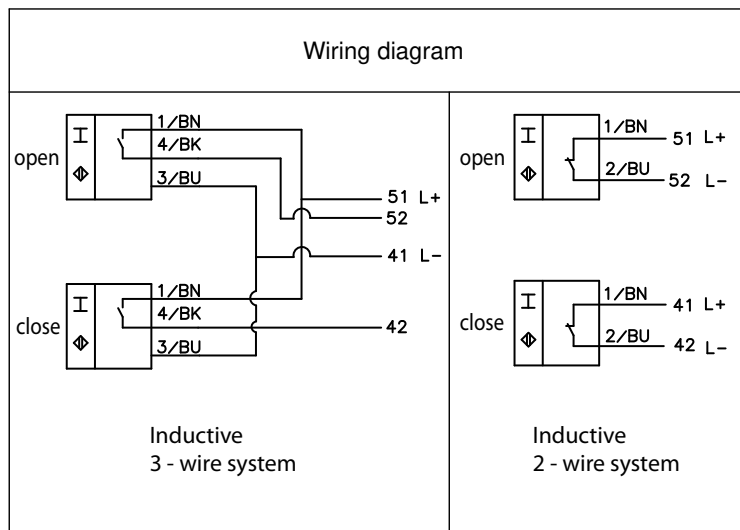


Figure 20: Scheme wiring diagram

8.5 SK.500/510 electrical actual-position feedback unit with mechanical limit switch for SISTO-C LAP.520/.530

For use with:

Actuated valves SISTO-C: S-C LAP.520/.530 SF/OF/AZ MD 40 - 202 (Fig. 21)

Purpose:

Electrical position detection for pneumatically actuated valves via mechanical limit switches.



NOTE

For retrofitting an actual-position feedback unit indicate the valve size and actuator size in the order. The three position indicator assemblies are matched to the valve sizes (Fig. 21).

Mounting:

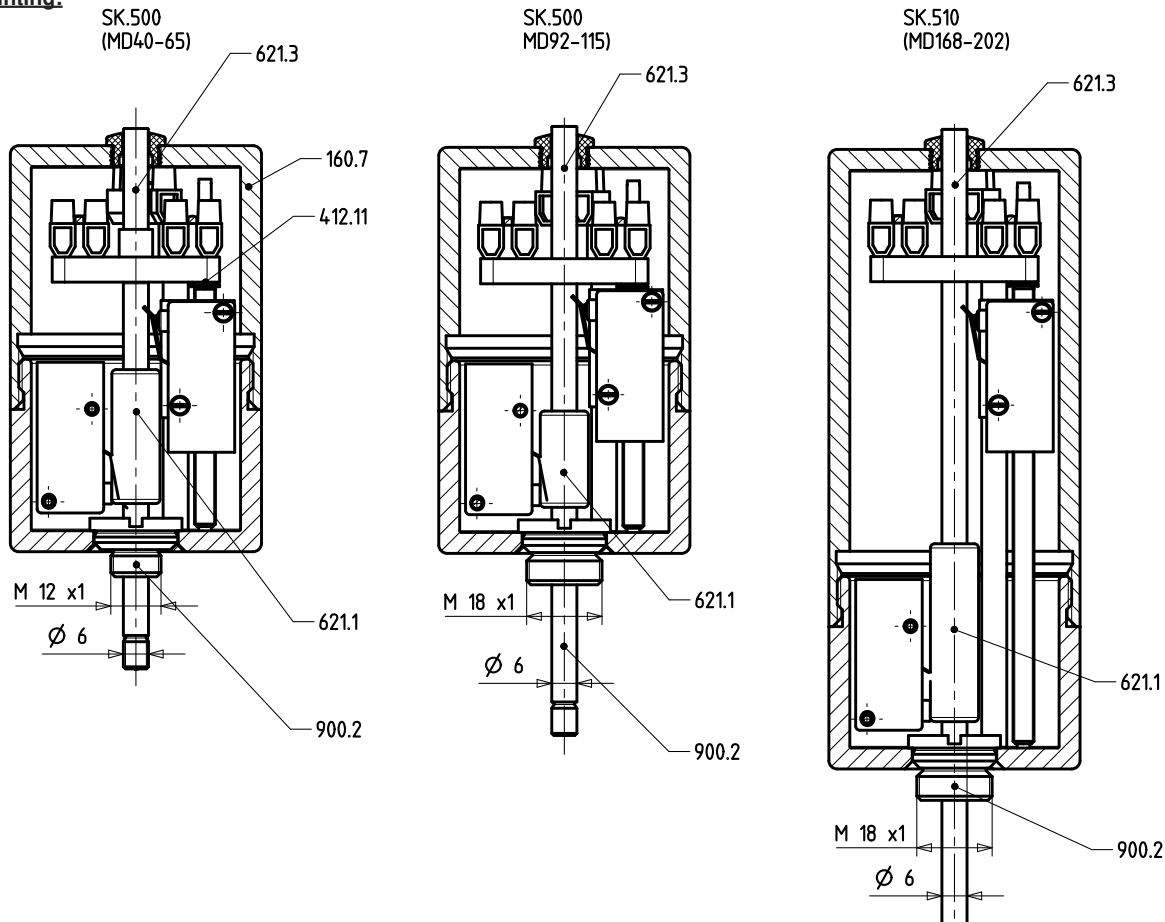


Figure 21: Overview of SK.500/510 actual-position feedback units with limit switches

Adjusting the actual-position feedback unit when supplied with the actuator:

1. Unscrew and remove the cover [160.7] (Fig. 15, Section 8.3).
2. The fine adjustment of the limit switches [814.1/814.2] can be made by turning the threaded stem [200.1] with a screwdriver.
3. Screw the cover [160.7] back on.
4. Check the switching function.

To be able to set the accessories correctly the valve bonnet with the diaphragm must be installed on the body in accordance with the operating manual.

For retrofitting the actual-position feedback unit carry out the following steps:

1. Remove the plastic cap of the actuator with an open-ended spanner (WAF13/WAF21). Unscrew the position indicator (Fig. 9, Section 8.1).
2. Unscrew and remove the cover (Fig. 15, Section 8.3).
3. Undo and remove the fastening screws of the terminals [81-29].
4. Remove the position indicator assembly [621.1] (Fig. 21).
5. Apply one drop of Loctite 243 to the thread of the fastening screw [900.2] of the limit switch box. Fasten it to the actuator and tighten it with a screwdriver.
6. Apply Loctite 243 to the thread of the position indicator assembly [621.1]. Screw it into the piston rod of the actuator. (Thread-locking agent Loctite 243 is not included in the scope of supply).
7. Screw the terminals [81-29] back on (Fig. 15, Section 8.3).

8. Perform fine adjustment of the limit switches [814.1/814.2] by turning the threaded stem [200.1] with a screwdriver.
9. Screw the cover [160.7] back on.
10. Check the switching function.

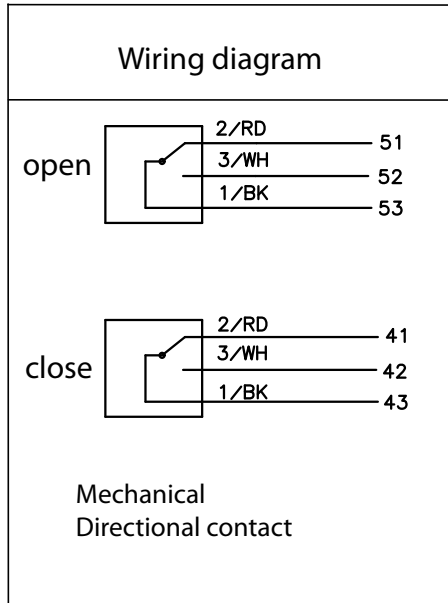


Figure 22: Scheme wiring diagram

8.6 Directly mounted inductive feedback unit for open position for SISTO-C LAP.520/.530

For use with:

Actuated valves SISTO-C: S-C LAP.520/.530 SF/OF/AZ MD 30 - 202

Purpose:

Actual-position feedback for pneumatically actuated valves.

Table 11: Inductive feedback unit

Pos. 814	Diaphragm Diameter (MD)	Actuator (mm)	Connection thread	Screw	Adapter
M12x1 Sensor	MD 30	K35	M12x1	Pos. 900	-
		K40			
	MD 40	K40			
		K50			
	MD 65	K63			
	MD 65	K80			
	MD 92	K80			
		K100			
		K160			
	MD 115	K100			
		K160			
	MD 168	K160			
K200					
MD 202	K200				
	KD200				

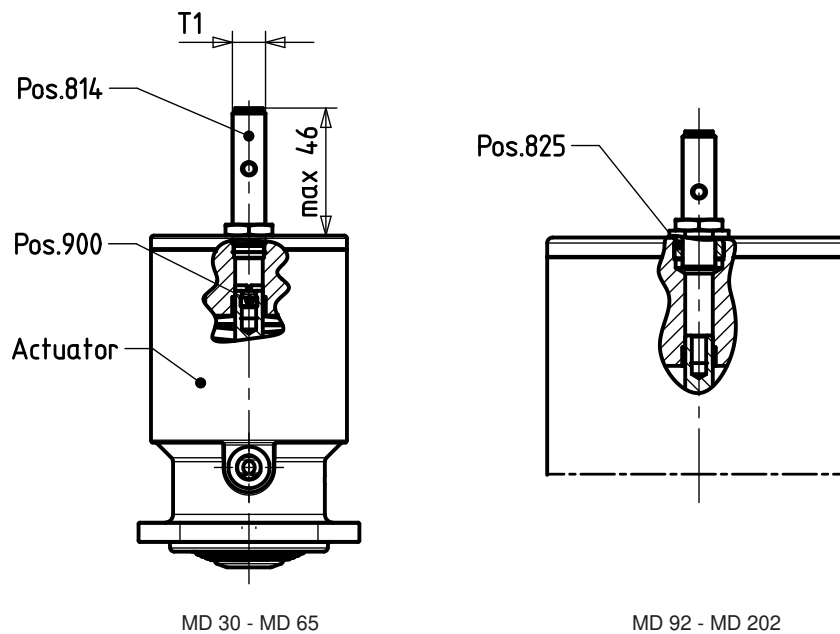


Figure 23: Design of the inductive feedback unit

1. Remove the plastic cap of the actuator with an open-ended spanner (WAF13/WAF21). Unscrew the position indicator [621.3] (Figure 9, Section 8.1).
2. (Depending on the function SF/OF/AZ) move the valve to open position.
3. At valves with connection thread M12x1: screw into piston rod of actuator screw [900].
4. At valves with connection thread M18x1: screw adapter [825] into thread of actuator and fasten with an open-end spanner (WAF19).
5. Screw the inductive limit switch [814] into the piston rod of the actuated valve until.
6. Unscrew by one rotation limit switch [814]. Observe that LED lights up.
7. Tighten the fastening nut (WAF17) of the limit switch [814].
8. Check the switching function again.

8.7 Electro-pneumatic positioner Samson 3730-X für SISTO-C LAP.520/.530

For use with:

Actuated valves SISTO-C: S-C LAP.520/.530 SF/OF/AZ MD 40 - 168

Purpose:

Positioner for pneumatically actuated valves.


	NOTE
	Observe the positioner manufacturer's operating manual included with the supply.

Table 12: Interface of the positioner

Fastening thread Part No. 900.2 (mm)	Diaphragm Diameter (MD)	Actuator (mm)
Connection M12x1	MD 30	K35
		K40
	MD 40	K40
		K50
	MD 65	K63
	Connection M18x1	MD 92
K100		
K160		
MD 115		K100
		K160
		K200

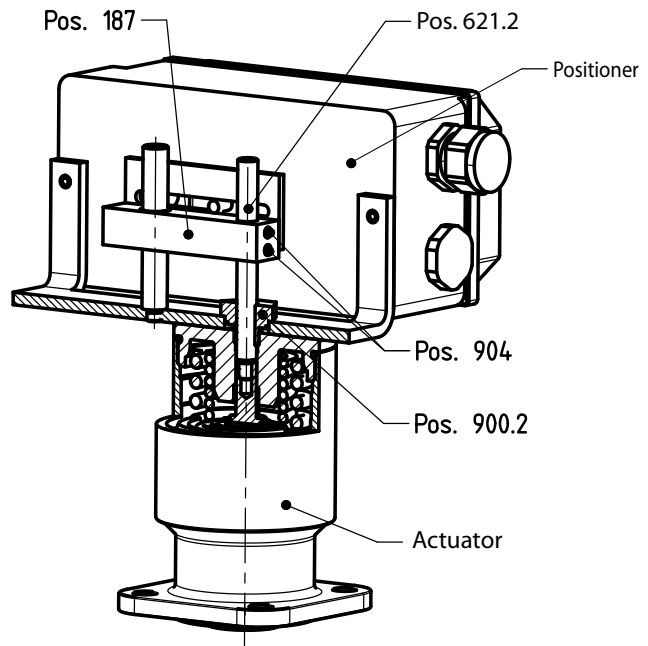


Figure 24: Design of the positioner

For a correct setting of the positioner the valve bonnet with the diaphragm must be mounted on the body as described in operating manual 0570.821.

For retrofitting the positioner unit on the valve carry out steps 1 - 4.

1. Remove the plastic cap of the actuator with an open-ended spanner (WAF13/WAF21). Unscrew the position indicator (Fig. 9, Section 8.1).
2. Fasten the positioner unit to the valve with the fastening nut [900.2] (WAF22).
3. Undo the grub screws [904] with an Allen key (WAF2.5).
4. Apply one drop of Loctite 243 to the thread of the positioner unit [621.2]. Screw it into the piston rod of the actuator. (Thread-locking agent loctite 243 is not included in the scope of supply).
5. Adjust the adapter [825] so that the lever of the positioner is in a horizontal position at half the stroke distance.
6. Re-tighten the grub screws [904] with an Allen key (WAF2.5).
7. Check the switching function.

8.8 Inductive feedback unit for open position and/or closed position for SISTO-C LAP.520/.530

For use with:

Actuated valves SISTO-C: S-C LAP.520/.530 SF/OF/AZ MD 30 - 202

Purpose:

Actual-position feedback for pneumatically actuated valves:

Sensor M12x1 for all sizes.

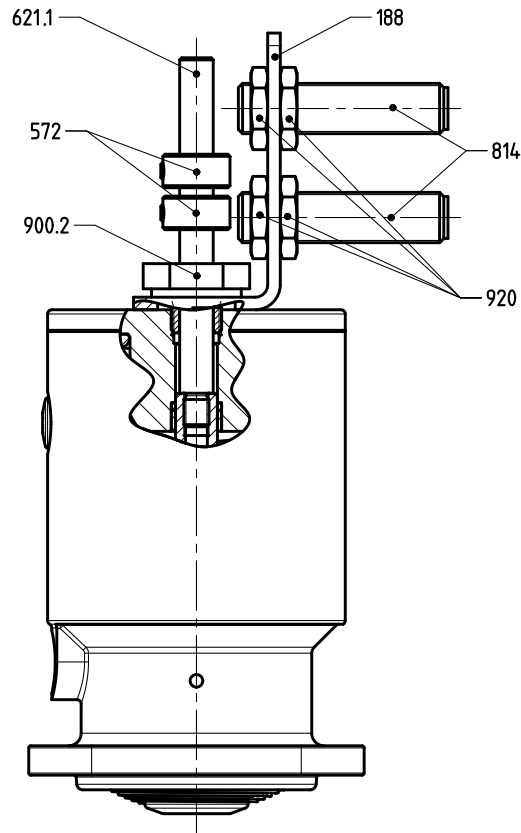


Figure 25: Design of the inductive feedback unit

For retrofitting the feedback unit on the valve carry out steps 1 - 4.

1. Remove the plastic cap of the actuator with an open-ended spanner (WAF13/WAF21). Unscrew the position indicator (Fig. 9, Section 8.1).
2. Apply Loctite 243 to the thread of the position indicator assembly [621.1]. Screw it into the piston rod of the actuator.
3. Place the fixing plate [188] with the limit switches [814] on the actuated valve. Fasten it with the screw [900.2] (WAF22).

Setting the limits switches:

4. Undo the grub screws of the switching flags [572] with an Allen key (WAF2.5). Set the switching flags to closed position and/or open position as required. The sensor reacts when the green LED at the sensor lights up.
5. If necessary, adjust the distance between the sensors [814] and the switching flag [572]. This can be done by using the fastening nut of the sensors (M12x1 WAF17/M18x1 WAF24).
6. Check the switching function.

9 Mounting and installation of the variants for HV.520 manually operated valves

9.1 Mechanical travel stop for HV.520 MD 168 - 202 in closing direction and opening direction

For use with:

Manually operated valves SISTO-C: S-C HV.520 MD 168 - 202

Purpose:

Travel stop for manually operated valves in closing direction and opening direction.

Mounting:

For a correct setting of the travel stop the valve bonnet with the diaphragm must be mounted on the body as described in operating manual 0570.821.

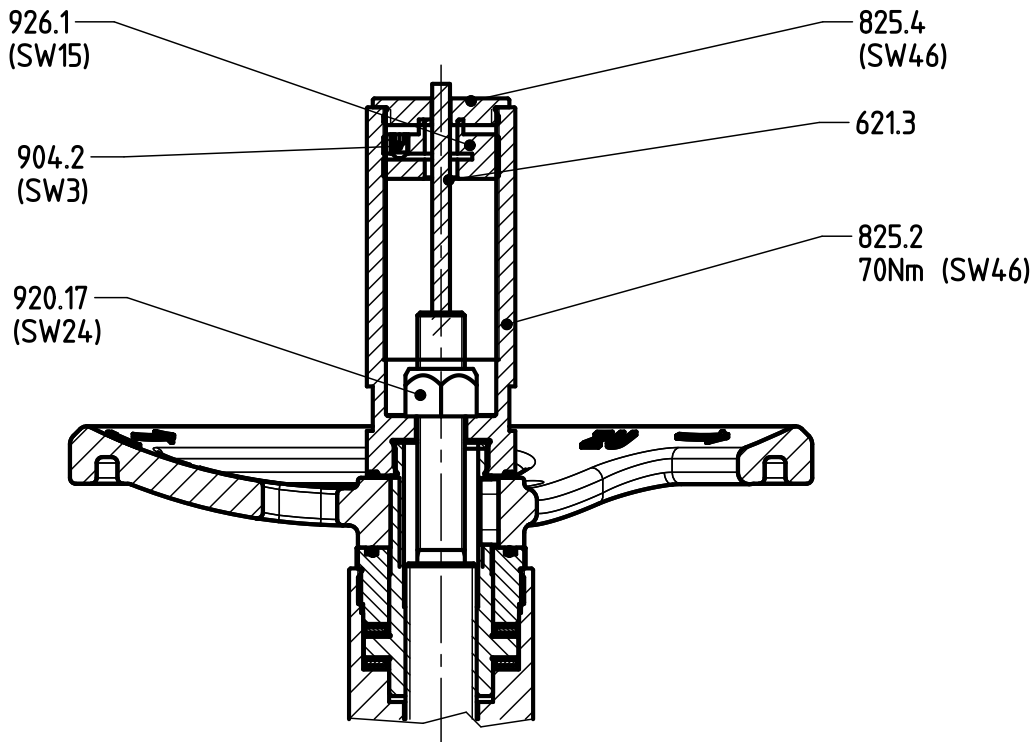


Figure 26: Travel stop in closing direction and opening direction, MD 168 - 202

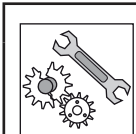
1. Screw on the adapter cover [825.4] with an open-ended spanner (WAF46).

Setting the travel stop in closing direction

2. Undo the grub screw [904.2] with an Allen key (WAF3).
3. Unscrew the position indicator [621.3].
4. Unscrew the adjusting nut [926.1] with a socket wrench (WAF15).
5. Adjust the stroke as required by means of the nut [920.17] (WAF24), e.g. with a socket wrench (21x24 DIN 896B).

Setting the travel stop in opening direction

6. Adjust the stroke as required by means of the adjusting nut [926.1] with a socket wrench (WAF15).
7. Tighten the grub screw [904.2] with the Allen key (WAF3) to firmly fasten the adjusting nut [926.1].
8. Finally, screw in the adapter cover [825.4]. Tighten it with an open-ended spanner (WAF46).



ATTENTION

This sequence must be observed:

1. Set the travel stop in closing direction.
2. Set the travel stop in opening direction.

10 Addition of the operating instructions, which corresponds to the 2014/34/EU Directive

Security



This symbol refers to safety precautions, which must be respected in reference to the use of valves potentially explosive atmospheres according to the 2014/34/EU to avoid personal injuries and damages to property.

- ◆ You have to mind that inadmissible operating methods are avoided if the valves are used in potentially explosive atmospheres. In particular, the overstepping of the limited operating maximum temperature is unacceptable.
- ◆ The user is bound to only install and use explosion-proof working material in potentially explosive atmospheres.

Installation

- ◆ In principle valves have to be included in the equipotential setting of the system if they are used in potentially explosive atmospheres.
- ◆ For use in potentially explosive atmospheres, the spring area of pneumatic piston actuators has to be connected to an explosion-proof air reservoir.

Operation

- ◆ The surface temperature of the valve's body corresponds to the temperature of the transported material. In each case the system's user is responsible for the observance of the working temperature. The highest authorized temperature of the material depends on the temperature class in each case.
- ◆ The heating of the valves components by the environment or by sun radiation shall be avoided.
- ◆ Additional mechanical load on the products (for example external forces and torques) must be avoided.

Servicing/Maintenance

- ◆ The user is responsible for maintenance works so that no ignition sources appear (for example electrostatic discharge, mechanically created spark).
- ◆ The user should periodically verify the equipment tightness of the body and the different tightness ranges for example with the help of a maintenance program.
- ◆ In principle, dust and dirt should be avoided on all valve surfaces.
- ◆ You have to use a wet cotton cloth to avoid electrostatic discharge while you are cleaning plastic surfaces and plastic-coated surfaces.
- ◆ The spare parts must be exclusively original SISTO parts.
- ◆ To prevent thermite reactions for actuators made of aluminium, contact with iron oxides must be ruled out. In addition, the valve must be protected against mechanical impacts.

Declaration

- ◆ Valves are components and they do not have their own potential source of ignition and are thus not covered by the 2014/34/EU Directive and must not be indicated by the reference ATEX.

If the instructions laid down for “safety, installation, operation and maintenance/servicing” are not complied with, proper operation of the valve within the meaning of Directive 2014/34/EU is not ensured. In this case, the valves must not be used in potentially explosive atmospheres.

The use of faulty valves in potentially explosive atmospheres is not authorized in each case.

DECLARATION OF CONFORMITY

Hereby we,

SISTO ARMATUREN S.A.
18, rue Martin Maas
L-6468 Echternach

declare, that the valves listed below comply with the specific safety requirements in accordance with appendix 1 of the Pressure Equipment Directive 2014/68/EU.

Description of the valve types:

**Diaphragm Valves
hand operated and
with pneumatic actuator**

SISTO-KB	PN 10	DN 32 - 200
SISTO-KBS	PN10	DN 32 - 200 ND 1 ¼ " - 8"
SISTO-10	PN 10	DN 32 - 300
SISTO-10S	PN 10	DN 32 - 200 ND 1 ¼ " - 8"
SISTO-10M	PN 10	Rp 1 ¼ " - 3"
SISTO-16HWA/DLU	PN 16	DN 32 - 200
SISTO-16	PN 16	DN 32 - 200
SISTO-16S	PN 16	DN 32 - 200 ND 1 ¼ " - 8"
SISTO-20	DIN PN 16 ISO PN 20	DN 32 - 200 DN 32 - 125
SISTO-B	PN 10	DN 32 - 100
SISTO-C	PN 16	DN 32 - 300

Swing Check Valves

RSK/ RSKS	PN 16	DN 32 - 300
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suitable for:

Fluid group 1 and 2

Conformity Assessment Procedure:

Modul H

Name and address of the authorizing and monitoring notified body:

TÜV Rheinland - Zertifizierungsstelle
für Druckgeräte der
TÜV Rheinland Industrie Service GmbH
Am Grauen Stein
D-51105 Köln

Number of notified body:

0035

Number of Certificate:

01 202 L/Q-04 0004

Nominal sizes \leq DN 25 (Rp 1") are developed and manufactured according to the same specifications as fittings $>$ DN 25 (Rp 1") and are therefore subject to „sound engineering practice“ in accordance with Article 4(3). A CE marking is not affixed.



Head of Design and
Development



Integrated Management
Manager

Echternach, 09.01.2020

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